

CompuKidsTM

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Vol. #1, Issue #4

computer magazine for beginners

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Programs**

That Darn Computer

**Where Did Computers
Come From?**



**WHAT CAN
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PARENT'S PAGE

Have your children ever been to camp? Are they interested in computers? Would they be interested in a special camp just for kids interested in computers?

CompuKids is conducting a small survey to find out how many kids of what age ranges are interested in special computer camps. If you could fill out the form on the bottom of this page and send it in, it would help us enormously! There is no obligation.

CLIP HERE

Send to: **CompuKids Camp Survey**

1709 W. Broadway
Sedalia, Mo. 65301

Name _____

Address _____

City _____ State _____ Zip _____

Children's names and ages: _____

1. Do you have a home computer? Y or N

 If yes, what kind? _____

2. Do your children know anything about the BASIC programming language?

 None Little Elementary Advanced Pro

3. Have they ever attended a regular summer camp? Y or N

4. Have they ever attended a specialized camp, such as a computer camp? Y or N If yes, where and what kind of camp? _____

5. Do you think your children would be interested in attending a computer camp? _____

6. What computer-related subjects would your children like to learn about if they attended such a camp? _____

7. How long should such a camp be? 1 week 10 days 2 weeks

8. How much would you expect to pay (per child) for a 1 week computer camp? _____

Thank You For Your Help!

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EDITORIAL

When the first computers (calculating machines, actually) were built, they operated simply by turning a crank, and performed only one function - adding. Later machines were powered by steam, but still did the same basic things, so no "program" was needed. As electronic computers were developed it was discovered that instructions could be stored inside the machine and used over and over, or modified to allow the computer to do different things. These stored instruction sets, or programs, made computers much simpler to use. The only trouble was that these programs would only run on the specific machine for which they were written.

The development of high-level languages like BASIC, FORTRAN, and COBOL enabled programs to be more universal. Today many programs will run on machines of different sizes and structures, as long as a few basic pieces are the same. Businesses dealing with the sale of computer programs (called software houses) have grown in the past few years, until now prepackaged

software is available for any machine for just about any use. One of the most popular packages sold is the accounting package, which includes general ledger, accounts payable, accounts receivable and sometimes payroll programs. Even the accounting packages, however come in specialized forms. Specially adapted accounting packages are available for such things as parts stores, retail outlets, construction companies, hotels and motels (those get pretty complicated, too!) and many more. And the list keeps growing.....

One reason for the growing availability of programs is that more and more people—especially young people—are becoming familiar with computers. Many programming firms' staff members are getting younger—some as young as 11! In fact, I recently met a young man only eight years old who already writes programs for himself! (I was impressed!)

I'm looking forward to seeing the computers that young people of today will be building tomorrow. But even more than that, I want to see the programs they come up with!

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Hello, Readers

We have some more good news for you this month. Instead of our radio show, "CompuKids Club on the Air," being on only five stations when it begins, it is now scheduled to be on 15 stations! We will be on the air sometime around the first of August. See next month's issue of **CompuKids** for more details, such as station location and approximate starting date.

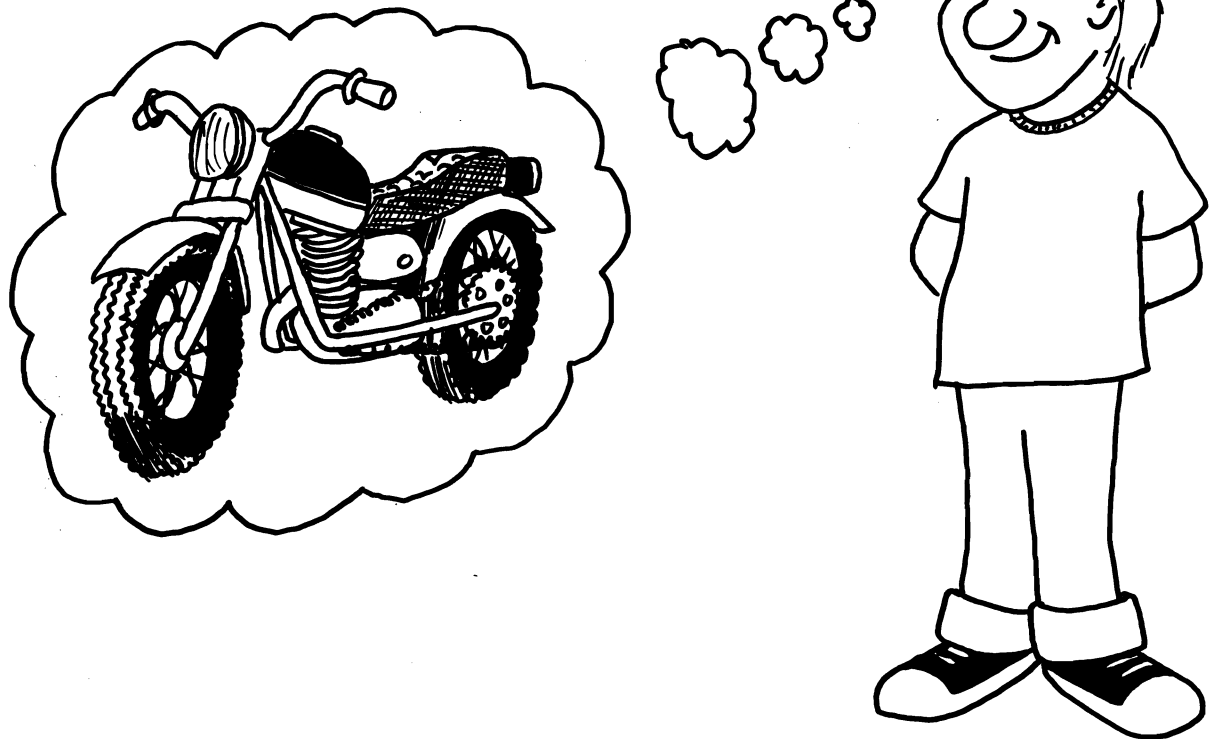
Would you be interested in going to a summer camp to learn about microcomputers and the BASIC programming language? If you are, there is a survey form on the Parent's Page (page 1) that you should get your mom or dad to fill out and send in. Then watch the "Hello, Readers!" page for news on any computer camps we hear about.

If you have been to a computer camp, or have heard of one, write us and tell us. We would like to know where it is, what kind of computers you use, and how you like it.

Coming Next Month

- ★ **CompuKids** talks to a 13-year-old computer technician!
- ★ Do you have problems in your computer programs? Meet the best problem-solver in the business — Detective D. Bugg!

That Darn Computer!



The youngster stepped down off the school bus, and wished for the 100th time that he didn't have to ride it. Then he wished again that he had a motorcycle. He didn't like the bus, the kids who rode it, the bus driver, the $\frac{1}{4}$ mile walk to the front gate, or the next $\frac{1}{4}$ mile walk to the house, all of it in every kind of weather.

"If I had a bike...."(Bike was how Ricky always thought of the motorcycle he wanted....) "If I had a bike, I could go where I wanted, when I wanted, and I wouldn't have to ride that stupid school bus anymore." Ricky continued down the road. He wasn't even able to enjoy that fact that he wouldn't have to ride the bus for a week. This was the beginning of Spring Break — no school all next week.

"And I've got four more years to go!"

Ricky walked toward home, slowly.

As he walked, he thought of the contest he had entered, and entered, and entered, over and over again. Two months before, he had picked up the mail on the way to the house and found an advertisement for a contest in a magazine. One of the prizes was a motorcycle just his size! Since he and his family live so far out in the country, he could get a permit to ride it to and from school when he turned 15 next year. His step got quicker as he neared the mailbox, and then he slowed down again as he remembered that the deadline had passed two days ago.

He looked at the farmhouse down the road and realized that it was getting late. He had chores to do, and his dad would be waiting. He stopped at the mailbox and reached in. He had given up on hearing from the contest people, and didn't notice the large envelope with the rest of the

mail. Ricky walked into the house, put the mail on the dining room table, called 'Hello' to his mom in the kitchen, and went through the house to his bedroom. He changed clothes and went out back to the barn. He began helping his dad load feed sacks onto the pick-up for the trip to the field.

"How was school, today?" Tom asked.

"It was okay, Dad,"

"Still having trouble with math?"

"Yeah, a little. But I'll get it. It's just that I don't see much use for it."

"There is always a use for smart people, son, and math is one of the things that can help..." They were interrupted by a shout from the house.

"Tom!!! Ricky!!! Come here, quick!!!" With barely a glance at each other they ran out of the barn and to the house.

"You won!!! Ricky, you won!!! You won that contest in the magazine," Ricky's Mom was holding the large envelope in her hand.

Tom said, "What does it say, Mary?"

Ricky stopped. "Did I win the bike, Mom?"

"I don't know yet...Come and see." As soon as they were standing on the back porch with Ricky's mom, she read out loud,"...Enclosed please find the certificate for the prize you have won."

Mary handed the papers to Ricky, and he saw the fancy certificate and read quickly to the middle...and saw his prize...a 16k microcomputer.

"A computer!!" He yelled.

"What?" His mom and dad said at the same time.

He repeated, "A computer! We won a dumb computer. I wanted a bike."

His mom and dad were looking at

the paper that Ricky was holding. "No substitutions, it says," his dad read out loud.

"I know, I know," Ricky said. "The computer is second prize and the bike I wanted is fourth prize. But I don't want a stupid computer, I want my motorcycle."



"Son," Mary said, "You can't be too disappointed. You won one of the second prizes in a national contest. Somebody thought one of those essays you wrote was pretty good."

"I know, Mom, but darn it...Well, I can't ride a computer to school...And what will we do with a computer anyway?"

"Well, son, we'll find a use for it," Tom said.

Rick turned to his dad and said, "I don't even want to think about it. Let's get that feed out to the cows. It's getting late."

Tom could see the disappointment in Rick's eyes, and neither of them spoke on the way out to the field. When they were through unloading and on their way back, Tom said, "Son, we'll find a way to use that computer, and I have told you that we will get you some 'wheels' when we

can."

Ricky looked at his dad. I know, Pop. It's just that I got my hopes set on winning a bike, and then over-shot."

They both laughed at that, and Ricky's mom laughed too when they told her about it at supper. "In all the excitement, I didn't get a chance to tell you some more good news. My sister is coming." At that, Tom and Rick both brightened up. Linda and her family were always a welcome change in the everyday life on the farm.

"When will they be here?" Ricky asked.

"Tomorrow at noon."

Tom smiled at that. "Just in time for dinner."

The next morning after the chores were done, Ricky and his dad headed for town. After stops at the grocery and hardware stores, they went to the computer center.

As they stepped through the doors, Ricky thought to himself, "I wish this was a cycle shop instead." He didn't have long to think about that, because they were greeted by a salesman who asked if they needed help. Ricky's dad showed him the certificate and the salesman smiled.

"Congratulations! I'll have someone get it ready for you."

After the salesman went to the office, Ricky turned to his dad and said, "I didn't know there were so many kinds of computers. I wonder what they all do?"

Ricky's dad replied, "I don't know, son, but I'm sure we can find at least one use for one." The salesman returned and asked Tom, "Have you or your son ever had any experience with a computer?"

"No, we haven't. We were just wondering how we were going to get

some use from ours."

"Well, there are all kinds of things that you can do with a home computer, and we will always be glad to help you."

"Can you show us something about the one we are taking home?"

"Well, this model is just like yours. And here are the books that go with it." The salesman handed Ricky five books that were full of information about how to use their computer. Ricky looked at the salesman and then at his dad with a worried look.

"There's an awful lot to learn here. Can that machine do anything on its own?"

"There are programs written for it that you can use. All sorts of business programs, games, and educational aids that can help you with reading, spelling, math..."

At that, Tom and Ricky listened a little closer because they were both aware that Ricky could always use some help with his math homework. The salesman continued, "But most people think that the real satisfaction with one of these is writing your own programs, to get it to do just what you want it to do."

"It must take a long time to learn how to do that," Ricky said.

"Not really. The commands are all in pretty simple, basic language, and you can learn very easily."

Two men came toward the front of the store carrying a large box, and the salesman said, "Well, here it is. Which car do you want it in?"

Ricky's dad led the way to the pick-up and moved several bags of feed to make room for the box. "Thanks," he said, after the men had set the box in the pick-up and tied it down.

"You're welcome, and come back anytime."

As they drove home, Ricky's dad

asked, "What do you see in those books, Son?"

"I'm not real sure, Dad. It looks like there is an awful lot to learn about one of these things."

"Well, we'll figure it out."

"Maybe so."

They arrived home and unloaded the truck, then came back for the box. They lifted it out and carried the computer into the house. Ricky and his dad carefully removed the machine from the big box and set it on the desk in the den. The three of them stood there and looked at it. Nobody really knew what to say.

"So far, so good," Tom said.

"So far it doesn't do anything." Ricky said.

Ricky's mom picked up the books from the table and looked through them quickly. "Well, I suppose we have a lot to figure out. Let's get started." She handed a book to Ricky, another to his dad, and said, "See what you can find."

They all sat around the desk and began to read. After a few minutes Ricky looked up, discouraged, and said, "This is getting pretty deep."

Mary said, "I've got to get started on dinner."

Tom said, "I've got to get to work on that tractor."

After they had both left, Ricky felt lost. He couldn't help but think that he wouldn't be having this trouble if he had won the bike instead.

He stayed with the machine, finally finding the instructions for turning it on. He flipped the switch and waited. "I thought these things were supposed to be *fast*," he muttered to himself.

Finally something appeared. He read in the book, and what was on the screen was right, so far. He began to type, slowly, on the keyboard. He

had found some of the simple commands and short programs, and soon began to understand a few things about how this computer worked. He thought to himself, 'Somebody around here has to make this thing worth something, and I guess it has to be me.'

He was beginning to understand a few of the basic words when his mother walked into the room. "I need to clear the table off in the dining room, Ricky. It's getting close to dinner time. Will you help me?"

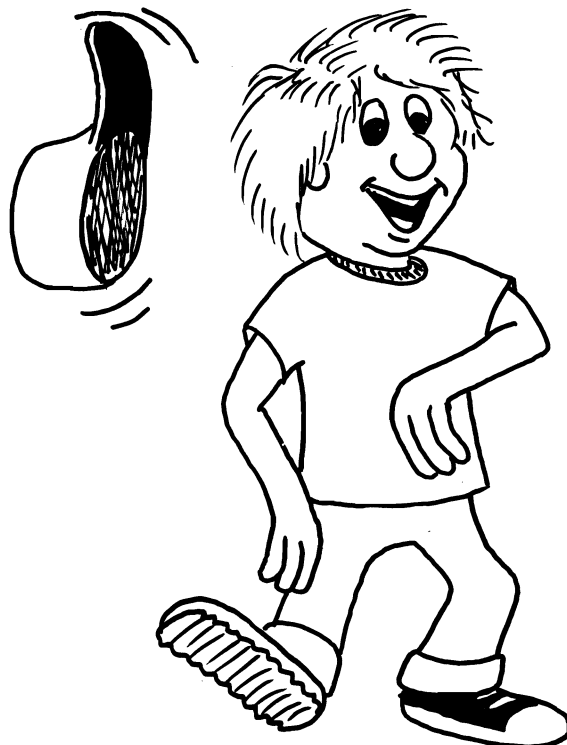
"Sure, Mom. You know, this thing may not be as hard as it looks."

"What have you found out?"

Ricky showed her how he had made the machine print the answer to multiplication problems. "Your calculator will do that," his mom said.

"Well, this thing will do a lot more, it's just that I have to figure it out."

They cleaned up the table and set the places for the big meal. "Linda and Julie should be here pretty soon," Mary said. "That computer should keep you and Julie occupied for a while."



Julie was Ricky's cousin. She was two years older than Ricky, and the two of them had always had fun together. She was one of the few girls that Ricky knew that he didn't think was dumb. Julie seemed to feel that Ricky was okay, too. Ricky's dad called to him from the back of the house and Ricky went through to see what he wanted. Tom had the tractor hitch apart and was cleaning the parts. "Bring me that tool box, would you?"

Ricky picked up the box, and took it to his dad.

"Find out anything about that computer, Rick?"

"Yeah, Dad, a little. It looks like it might be okay."

"What can it do?"

"That's a big question. But from what little I saw, it can keep the books on the business here, help me with my homework, keep all kinds of files, and it can play games like crazy."

Tom had the hitch back together, and was picking up the tools. "Do you think we can learn to use it?"

"I think we can, Dad," Ricky answered.

As they were getting ready to go into the house, they heard the crunch of tires on gravel, and turned to see Linda and Julie arriving. Ricky called to his mom, "Mom! They're here!"

The five gathered around the car, saying 'hello' and quickly catching up on family news.

"I didn't get a chance to tell you — Ricky won a prize in that contest he entered so many times." Ricky's mom was proud of him, but she knew he wasn't as happy with the computer as he would have been with the motorcycle.

"That's great, Ricky! What did you win?" his aunt asked.

"Well, it's a computer." Ricky said,

not too happily.

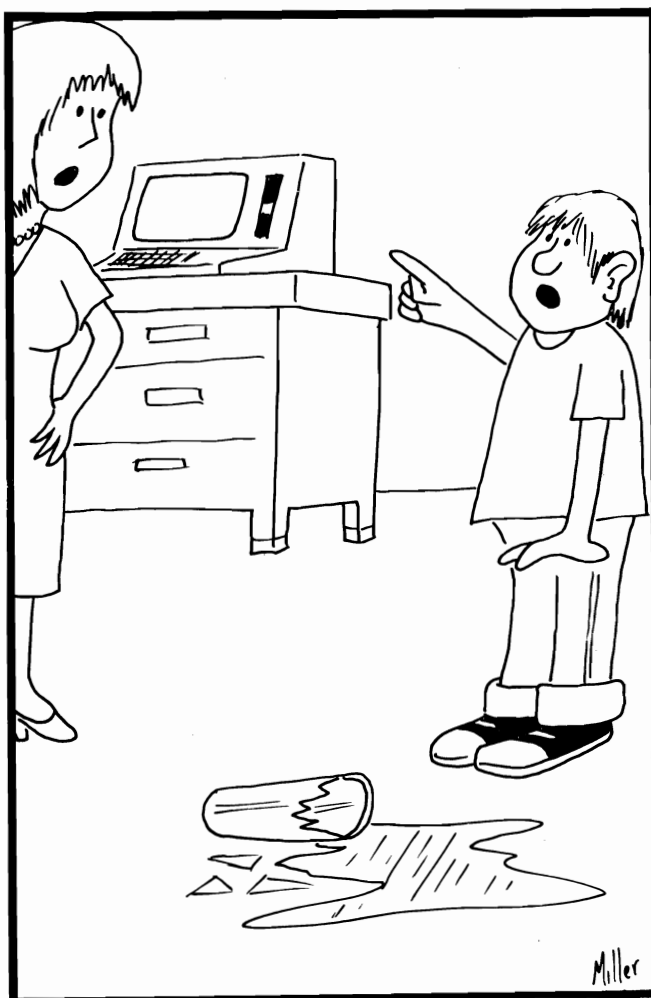
As he said that, Julie's eyes got big, and she said, "Wow! You mean a real computer? Like we use in school?"

Ricky's dad said, "Well, it's real all right. And if you know anything about them you know more than we do. We could sure use some help."

Ricky looked at his dad. "Well, we'd better eat first. This could take a while."

Tom and Ricky picked up the luggage and followed the ladies inside. After they got everything settled in the guest room, Julie hurried to the den where the computer was. She said, "Oh, boy! It's just like the ones we use!" Ricky didn't know quite how to feel about

(continued on page 36)



He did it !

HOW TO COPYRIGHT YOUR OWN PROGRAMS

Anyone who has ever spent any time sitting at a computer knows that they are one of the best things ever devised to stimulate ideas. We often sit at the computer with no plan in mind, come out hours later with a program the likes of which we have never seen, and then say to ourselves, "Gee, I think that this program is pretty good. I wonder how I can protect it." Well, it's not that simple — as we found out when the editor at **CompuKids** asked us to write about the subject.

One of the first things we wondered when we began researching information for this article was: How useful is a copyright for a computer program? Other questions in mind were: What programs should I copyright?, How hard is it to obtain a copyright?, and What is the procedure for getting a copyright? The information we got while attempting to answer these questions is what this article is about.

Because Terry and I like to keep things organized, we will begin at the beginning.

First of all, what is a copyright? One accepted definition is, "A form of protection provided by the laws of the United States to the authors of 'Original works of authorship'."

Copyright protection of original works of authorship is authorized by the U.S. Constitution, Article I, Section 8, Clause 8.

If you own a copyright, you have the right to do the following things.

1. To reproduce copies of the work.
2. To expand the copyrighted material into new material using the same characters, etc. (Like a spin-off of a T.V. series.)
3. To distribute copies of the work however you want to.
4. To perform the work publicly, if that is what it is for.
5. To display the work publicly, like movies, or sculpture.

Now, where does a computer program come in?

There are seven (7) types of works that can be copyrighted. These are:

1. Literary Works
2. Musical Works
3. Dramatic Works
4. Pantomime and Choreographed Works
5. Pictorial, Graphic, and Sculptural Works
6. Motion Picture Works and other Audio-Visual Works
7. Sound Recordings

You'll notice that what you and I call a computer program is not listed there...or if it is, we can't tell it. If you were a judge or an attorney, where would you put it?

Well, the copyright office says that computer programs are non-dramatic-literary works. This at least has the advantage of placing them in a bureaucratic cubby-hole. This classification of programs (as non-dramatic literary works) evolved over the last 25 years and is a result of the way that computers developed from huge one-of-a-kind monstrosities filled with vacuum tubes down to the microcomputers and subminiaturized machines that we are familiar with, and the huge growth in the numbers of computers and their versatility. It should also be kept in mind that these monumental changes in computer hardware required that computer software change to keep up with the increasing demands of both the machines and the people who used them. Along with these changes came the need for laws to protect computer software.

In the early days of computers, there were no laws to protect software, and none were really needed. The first copyright law in this country came about over a century and a half before the first transistorized computer. When the 1790 law was passed, naturally no one had ever heard of an electronic computer or a program to use with it. It was 1959 before IBM developed their first computer using transistors, the direct ancestor to the microcomputers of today. The computer that IBM built was used by the defense department as part of an early warning system. Early computers were highly specialized. For

this reason, the scientists who developed them could not foresee the manifold uses to which computers would one day be harnessed. Because high level languages, like BASIC, were not yet fully developed, computers were limited to using the programs that were written specifically for a certain machine. This made the exchange of programs between computers so difficult that it was rarely, if ever, done. It is easy to see, therefore, that neither the need nor the desire to protect programs arose, because a program would be useful only to someone with that machine. This was one of the reasons that IBM came up with their "bundling" system. Bundling was what IBM called their practice of giving away the software when a client bought an IBM computer. Other computer manufacturers, such as G.E. and Honeywell, among others, copied the bundling approach in the marketing of their products.

The increasing adaptability and availability of software written in improving high level languages, like FORTRAN and COBOL, led to a system called sharing, which could be thought of as the first users groups. Members of sharing groups were allowed to use the shared programs at no additional charge. The pool from which the software was drawn was created by the members of the sharing group, and contributed to by the computer manufacturer as incentive to purchase his machine. Both of these concepts, sharing and bundling, continued to contribute weight to the idea that computer software was virtually unprotectable.

Because of the realization among manufacturers that software was not

readily protectable, some of them began to hold back programs from the sharing groups that would give an obvious competitive edge to the manufacturers. These programs were used by the manufacturer to help keep him a jump ahead of the competition. It was this simple secrecy that can be thought of as the first form of protection afforded to software. It would be well to keep in mind that at this time there was no copyright protection by law. This made secrecy the only form of real protection for computer programs that were a significant step up on the programs that the manufacturer contributed to the share groups.

During the late 1950's and early 1960's the first software houses were formed. The formation of these houses was a major turning point in the history of the computer revolution. Because of the growing need to provide some form of protection other than secrecy, the Copyright Office began registering copyrights of computer programs in 1964. This practice was officially recognized by Congress with the passage of the Computer Software Copyright Act of 1980. That Act also included a definition of a "computer program" as "a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result." The Computer Software Copyright Act of 1980, of course, does not answer all the questions concerning protection of software, but it does go a long way to establishing the concept of a program as being property of the author. Programs are now recognized as being valuable property that can be bought and sold. It is clear that programs in written form fulfill all the criteria for copyrights, but

from that point, not too much *is* clear.

The Copyright Office will accept programs for registration, as non-dramatic literary works but the question of infringement is still one that the courts must decide. However, most software companies and most computer manufacturers routinely register their programs for copyright, in spite of the dubious protection that the process affords.

With these facts in mind, we can see that copyrighting computer programs is a good idea, but the benefits it may provide are in question. It may not help to have a program of yours copyrighted, but it probably won't hurt. In any situation like this, it is always best to consult an attorney. These are the people whose job it is to find answers to questions like these. If you have a program that you believe is unique and warrants protection, the thing to do is talk it over with an attorney.

If you decide to go ahead and copyright a program of yours, here are some of the steps that you will need to go through.

After all this, it may sound too simple to copyright a program. All you really have to do is write a program and make a copy of it. The copy can be on cassette or disk, it doesn't even have to be printed. If you have done this on programs you have already written, programs that are original with you, then you have copyrighted them. If the program is to be published, then there are further steps you must take. Somewhere on the program listing must appear the information that this program is copyrighted by you. This information must take the form of the letter "C" in a circle, or the word copyright, or the abbreviation, "COPR", followed by the year of the

first publication, and then followed by the name of the owner of the copyright. For example: COPR. 1982 James Jones. It is your responsibility to see that this information is on the program listing, and does not require approval beforehand from the copyright office.

If you have completed these steps, your program is copyrighted. However, in order to receive the full benefits of the law's protection, there are still further steps to take. Now that the program is copyrighted, you have to protect the copyright. This is done by registering your copyright with the Copyright Office. This is so that there will be a public record of your copyright should any question arise about original authorship at a later date.

Copyright protection has changed. By the 1976 law, it now lasts for the life of the author plus 50 years. Where there is more than one author, as is the case in many computer programs, then the copyright lasts for 50 years after the death of the author who lives longest. A copyright can be registered anytime in the life of the author. If a program is registered in unpublished form, you don't have to register it again when it does get published.

Registering a copyright is not hard, but it is important to follow the steps just as the Copyright Office wants them. This is where an attorney comes in. You have to get three things together to apply for registration: A form TX, a \$10.00 registration fee for each item to be registered, and a copy of the item to be registered (one copy if it is not published, and two if it is).

Form TX is usually obtained from either your attorney, or by calling, 202/287-9100. Form TX must be

completed in ink, or typewritten, and only this authorized form (not copies) can be used, because it becomes a permanent legal record. The first time you complete the form, it would be wise to get the help of an attorney. This is because the form becomes the property of the copyright office, and must be accurate. Instructions about filling out form TX are on the form itself and are usually all you'll need after the first time.

The \$10.00 registration fee should be made by check or money order, payable to the Register of Copyright, and should be firmly attached to the application.

The copies that you send along with the other two items should be your best, most complete copies, and probably would be best as a print-out of the program listing rather than a cassette or other form. Your attorney can best advise you as to these matters.

One point that must be stressed now is that these three items *Must Be Sent In The Same Envelope*. This is very important, since the copyright office will not accept them otherwise. It should be addressed to:

The Register of Copyrights
Library of Congress
Washington DC 20559

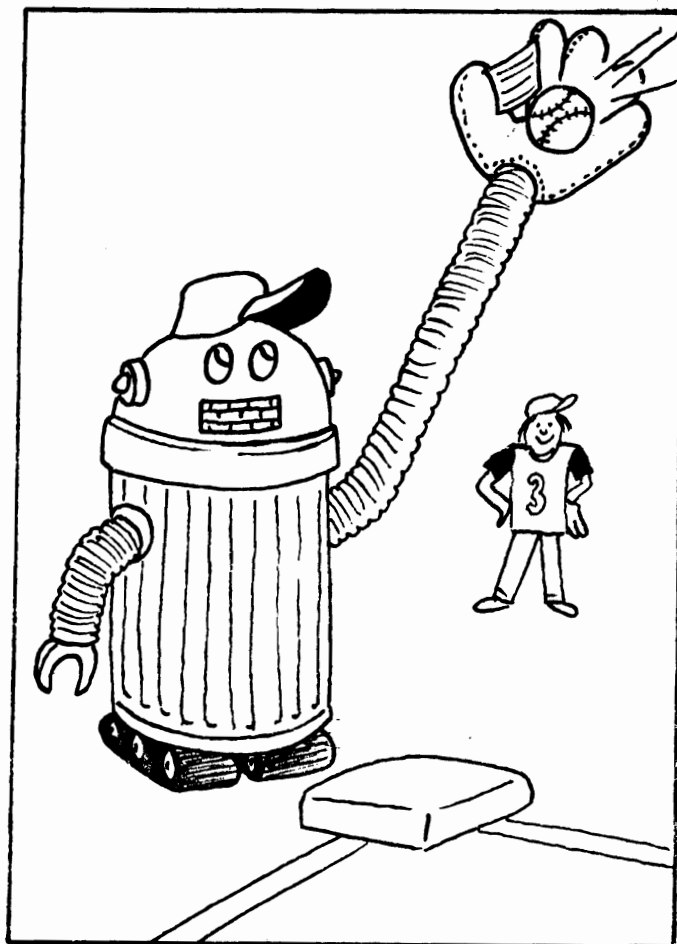
Even if you are under 21, you can still obtain and register a copyright and be given the full protection of the law. However, any contract you might enter into as a minor is subject to laws that vary from state to state. This is another thing that you might talk over with an attorney.

We have tried to give you an idea of copyrights and how they came to be, and how they might benefit you as a computer programmer. There should be enough information here

to get you started on copyrighting your own programs. If you are like the rest of us who find that writing computer programs is exciting, then you may want to consider copyrighting as a means of protection for the programs you write. Programs are valuable and they take time to perfect. Copyrighting them is a good way to protect the time you have invested in writing them.

For further information, write to the:
Information and Publication
Section LM-455
Copyright Office
Library of Congress
Washington DC 20559

Ask for Circular RIC, or publications of the Copyright Office. The Copyright Office will send you available information, but is not permitted to give legal advice. That is another good reason to see your attorney!



ATTENTION WRITERS

We are searching for good free-lance writers.

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Sedalia, MO 65301
Telephone (816) 826-0689

the CAI

Are you a part of the CAI? No, not the CIA, but CAI—computer assisted instruction. As a student, you are an important part of CAI.

CAI is a term that is being heard more and more in classrooms at schools across the United States. Although CAI is gaining much attention, there are also many misconceptions and confusions. So what is CAI?

Due to the recent rapid growth, the field of computer support in education has developed with little organization. There are varying definitions—those which are very broad and those which are more specific. CAI, on one end, may be defined as instruction that is carried out by means of a computer. Some hold to the idea that CAI includes all uses of the computer in schools. Herein lies the misconception of what CAI is. There are primarily four areas of application of the computer in education. They include: a subject of instruction, a research and development tool, a management aid, and a method of instruction. It is the latter that is describing CAI. A more specific definition might be one noted by Leonard and Gloria Silvern.

"CAI is a man (student)-machine relationship in which the man (student) is a learner and the machine is a computer system. Two-way communication exists, with the objective of human learning and retention...During instruction, the only humans in the system would be learners. The mere presence of a

computer in an educational environment is not sufficient to define it as a computer-assisted instruction system...to be simply a tool to assist in solving problems or retrieving information...but the term CAI should be reserved for those particular learning situations in which a computer contains a stored instructional program designed to inform, guide, control, and test the student until a prescribed level of proficiency is reached."

No matter what definition is accepted, it seems to be a general agreement that CAI must include both instructional material presented to the learner under computer control and interaction between the learner and the computer.

Just the word "computer" sometimes scares students, as well as teachers. As students and teachers are taught how to use computers to their advantage in teaching and learning, the reaction to the word "computer" will be a more positive one.

Students sometimes see computers in school used only in classes where programming the computer is the type of instruction. In this atmosphere, the computer is the subject of instruction. Those not interested in writing software (computer programs) should begin to realize that the computer can be a more imaginative and challenging means of learning a geometry theory, a soliloquy from Shakespeare, the

German vocabulary, or even diagramming sentences.

The widespread use of the new "home" computers or microcomputers sold in retail stores is progressing students' computer literacy at home as well as at school. Manufacturers estimate that there are about 30,000 home (or micro) computers in schools across the United States — a figure that was estimated to have tripled in 1981. Due to figures like these, teachers are realizing that they also need to become computer literate.

The term "computer literacy" has been introduced to indicate an individual's familiarity with the fundamentals of computing. From **The Mathematics Teacher**, Camille Price states:

"... an essential outcome of contemporary education is computer literacy. Every student should have first-hand experiences with both the capabilities and the limitations of computer through contemporary applications."

Thus computer literacy is mainly the responsibility of the teacher in the classroom. Teachers must take an active part in programs, available media and be knowledgeable in CAI.

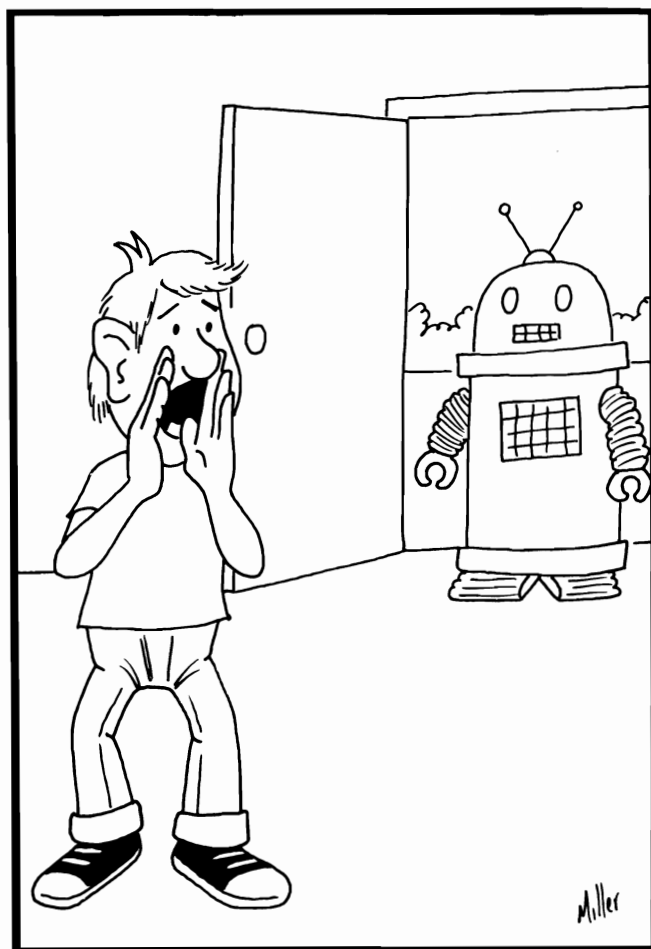
Many teachers do not wish to incorporate CAI in their subject matter. It is this reason why it is important that students become involved with CAI at home and/or at school.

CAI includes games like Monster Making on the PLATO system that helps students understand their fractions. One game takes students' sentences and graphically portrays what the sentences have stated.

No matter what the subject, CAI

can make learning fun and personable for you — the student. It is also possible that your interest in CAI can motivate your teacher to use CAI in the classroom. With the increasing software packages and availability of microcomputers in school systems, it is a good possibility that a teacher can incorporate CAI in the classroom with more ease than in the past.

- 1— Salisbury, Alan B. "Computers and Education: Toward Agreement on Terminology" The Educational Technology Review Series, No. 9, New Jersey: Educational Technology Publications, 1973.
- 2— Price, Camille C. "Microcomputers in the Classroom." The Mathematics Teacher, May 1978, Vol. 71, No. 5, p. 425.



MOM!!

Computer QUIZ

Match the words with the definitions below.

- 1 ANALOG
- 2 BYTE
- 3 EPROM
- 4 STANDARD
- 5 ROUTINE
- 6 RETRIEVE
- 7 RESET
- 8 IMAGE
- 9 BASIC LANGUAGE

- 10 BOOTSTRAP
- 11 REAL-TIME CLOCK
- 12 PROCESSOR
- 13 BOS
- 14 ABORT
- 15 KILOBIT
- 16 PROGRAM
- 17 KILOMEGA
- 18 CALL WORD

— To stop the running of a program on a computer when something goes wrong that needs correcting at that time.

— One thousand binary digits.

— Erasable programmable read only memory erasable by exposure to ultraviolet light.

— A clock that reflects actual time in contrast to fictitious time.

— A prefix meaning one billion.

— To return a condition to its original amount or state.

— A set of coded computer instructions used for a particular function.

— To find and select information that is stored.

— The word that identifies a computer program sub-routine.

— The unit in a computer system containing logic and control.

— An exact logical duplicate of something stored in a different medium.

— Beginner's all purpose symbolic instruction code.

— Basic Operating System

— A common technique used to start the reading of computer programs into the computer.

— Eight bits of data.

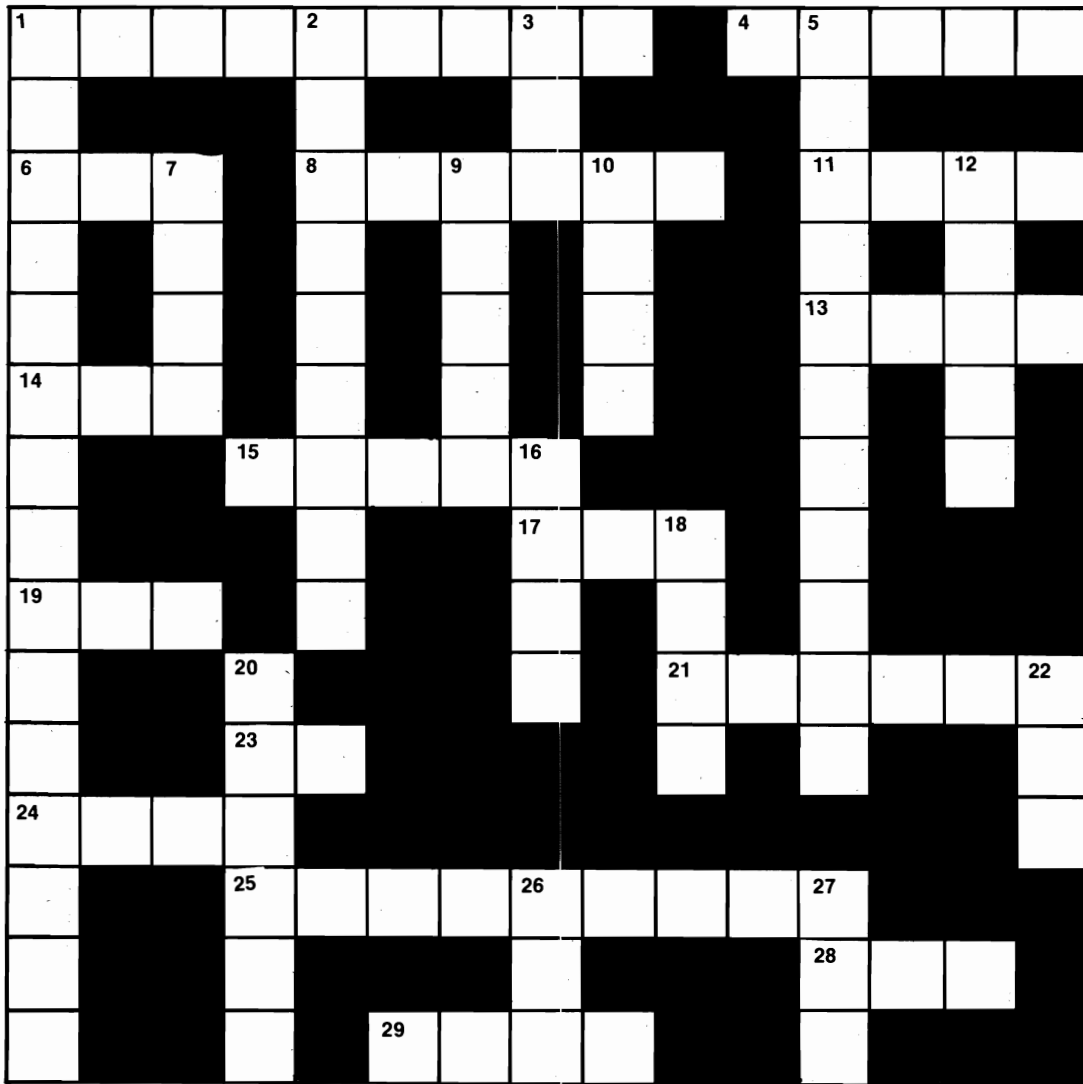
— An accepted set of criteria for measure of performance.

— A series of computer instructions used to solve a problem or code in computer languages.

— The representation of numerical values by means of physical variables.

COMPUKIDS

ROSSWORD



ACROSS

- 1 The heart of a computer system, which includes the CPU and ALU. A large computer as opposed to a mini or a micro.
- 4 Term for a small computer.
- 6 Not a HI, but a _____.
- 8 A video monitor is an _____ device.
- 11 To _____ an input with the keyboard.
- 13 A row of characters.
- 14 To fill in a unit of data such as a block with zeros or other fillers.
- 15 What do printers print on.
- 17 To specify end of a program.
- 19 Cathode Ray Tube.
- 21 Instruction book.
- 23 Input/Output
- 24 A _____ on message.
- 25 A fixed step-by-step procedure used to accomplish a given result.

28 A light.

29 Real- _____ clock.

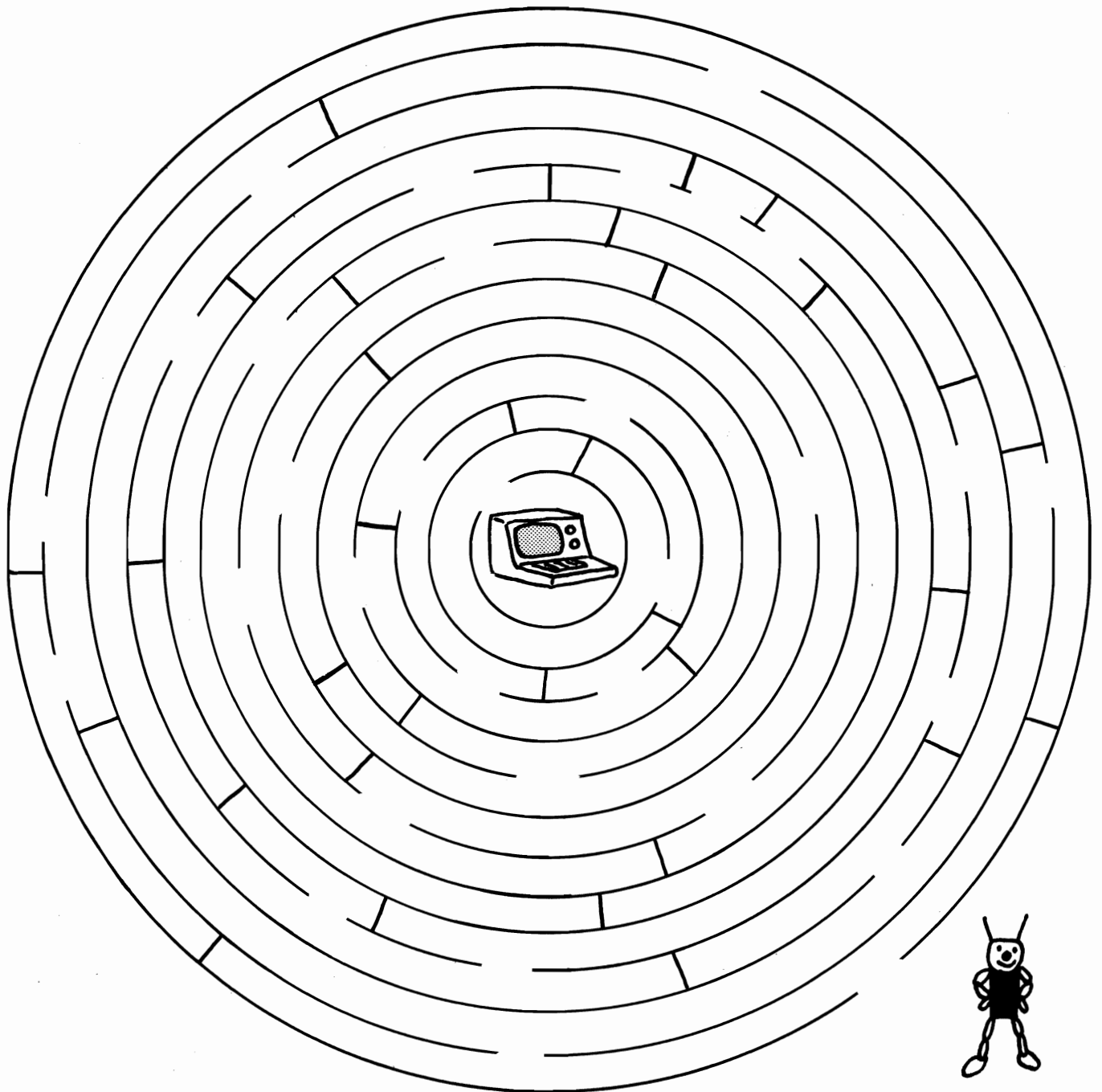
DOWN

- 1 The use of two or more computer processing units in the same system at the same time.
- 2 A graphical representation of a process.
- 3 A list of the contents of a storage device.
- 5 Not dumb, but an _____ terminal.
- 7 A set of characters
- 9 A set of data in a tabular form for easy reference.
- 10 The whole elements is a _____.
- 12 A front _____ computer.
- 16 To sense recorded data.
- 18 A non-intelligent terminal.
- 20 A numbering system based on 2's rather than 10's.
- 22 Light emitting diode.
- 29 Random Access Memory.
- 27 Microprocessor unit.

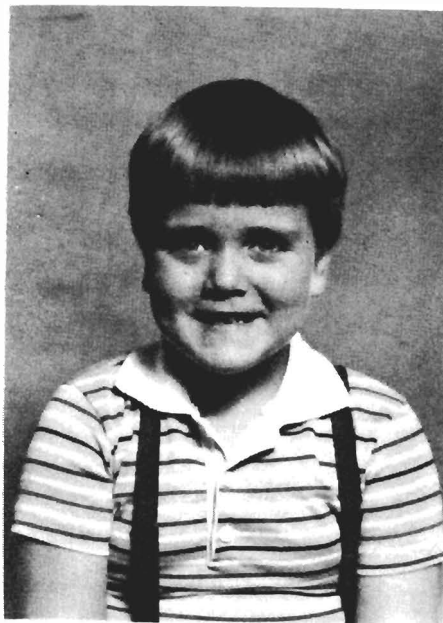
A-MAZE-ING!

Help the Computer Bug find his way.

Answers in next issue!



CompuKid of the Month



The *CompuKid of the Month* for July is only six years old! Matt Giwer of Annadale, Virginia, is six years old and goes to school at the Fairfax Academy of Early Learning. His father is a civilian that works for the Navy.

Matt and his parents have an Atari 800 computer at home. Games are his favorite thing to play on the Atari, and his favorite game is "Jaw-breaker." Matt says it's a little bit like PacMan, only different, and he usually gets around 100 points in a game.

In school Matt's favorite subject is science — science about plants, animals, people — all kinds of science.

When he grows up, Matt wants to be a policeman. He says he likes

guns, and he knows the police use computers to help them track down criminals.

At four foot two inches, Matt is tall for his age. His favorite food is macaroni and cheese, and his favorite hobby is "inventing" things. He is busy right now drawing plans for a "vaporizing gun" and a "flying saucer," both of which are powered by nuclear energy.

Matt has no plans to go to college yet. Right now he doesn't like school very much, and he doesn't want to go to college unless he has to. (He doesn't need to go to college to be a policeman, he pointed out!)

Matt Giwer is a very bright young man. **CompuKids** wishes him the best of luck!



MATT GIWER

Where Did Computers Come From?



Review

In 1642 Blaise Pascal's digital counting machine was designed, using numbered gears that "counted" when a crank was turned. By 1694 Gottfried Wilhelm von Leibnitz had invented a machine that could add and subtract; and by adding or subtracting and shifting, it could also multiply, divide, or extract square roots. The first desktop calculator was built by Tomas of Lolmar (Charles Xavia Thomas) in 1829. It could add, subtract, multiply, and divide, and became very popular with businesses.

In 1822 Charles Babbage of Cambridge, England, had built a working model of his difference engine, the first steam-powered mechanical calculator to use a program, and on the strength of the model the British

government provided financial help to build a full-scale version. Babbage worked on this project for 10 years, then lost interest in favor of a new design. Neither design was completed, however, mainly because of a lack of precision-made parts.

In 1880 Herman Hollerith used his own calculating machine in the 1880 Census. His machine used punched cards, but he was not happy with the "readers." By the 1890 Census, he had replaced the mechanical feelers with electronic sensors. In 1911 Hollerith merged with two other companies to form the Computing Tabulating Recording Company, which later became International Business Machines Corporation — IBM.

During the 1900's several electro-mechanical computers were built using some electronic and some mechanical parts. The first all-electronic computer, the ENIAC (Electronic Numerical Integrator and Calculator) was built in 1944 by J. Presper Eckert, Jr., and John W. Mauchly, of the University of Pennsylvania.

ENIAC contained 18,000 vacuum tubes and could perform 5,000 additions or about 300 multiplications per second—1,000 times faster than previous machines. It was built primarily to calculate information for the U.S. Army, and remained in service until 1956.

The first machine to store a program in numerical form was EDVAC (Electronic Discrete Variable Automatic Computer). It was

designed and built by John Von Neumann, and was completed in 1949.

In 1951 Eckert and Mauchly, the developers of ENIAC, announced the UNIVAC (Universal Automatic Computer), the first computer able to handle both numbers and alphabetical characters equally well. It's I/O (Input/Output) equipment was separated from the computing unit—another first. It also became the first computer to be mass-produced and commercially available.

In the years between 1944 and 1964, Mauchly, Eckert, and Neumann developed eight basic ideas for computer design which are still in use today. These ideas included:

1. Separation of control, storage, and arithmetic functions.
2. Random Access Memory (RAM)
3. Stored-program capabilities
4. Arithmetic modification of instructions
5. Conditional branching of programs
6. Flow-charts for programming
7. Choice between binary and decimal number representation
8. Choice between serial and parallel operation

Part 4

There were two major reasons for the advances of the computer industry in the 1950's. One was the invention of the transistor in 1948 by the scientists of Bell Laboratories. The other was the introduction of magnetic core memory.

In 1950, H. H. Aiken of Harvard University built the Mark III, one of the

last large computers to use magnetic drums as primary memory. The Mark IV, a revision of Mark III, was completed in 1952.

In 1950 a method of storage using cathode ray tubes was introduced. The first and most successful of these devices was built by Frederick C. Williams of the University of Manchester, England. His device was used in IBM's 701 and 702, and Engineering Research Associates 1103.

At Massachusetts Institute of Technology (MIT) construction on the Whirlwind Computer was completed in 1950. The Whirlwind originally used CRT memory, but in 1951 J. W. Forrester of MIT introduced magnetic core memory. This was installed on the Whirlwind in 1953, making it the first full-scale computer to use magnetic cores.

Magnetic core memory quickly replaced other forms of storage, being faster than drums and delay-lines, and more reliable than cathode-ray tubes. They were also relatively inexpensive. After magnetic core had been proved to be practical, many large computers using them were marketed commercially. Companies manufacturing such machines include IBM, Sperry-Rand (which had merged with Electronic Research Associates), Burroughs, Radio Corporation of America (RCA), Control Data Group, General Electric, Philco, and Honeywell. From 1953 on, only smaller, slower machines like the IBM 650 used magnetic drums for primary memory, although several machines still used them as back-up.

By 1954 the pioneering age of computers was over, and the computer industry was now just another business enterprise. Transistors had almost entirely replaced

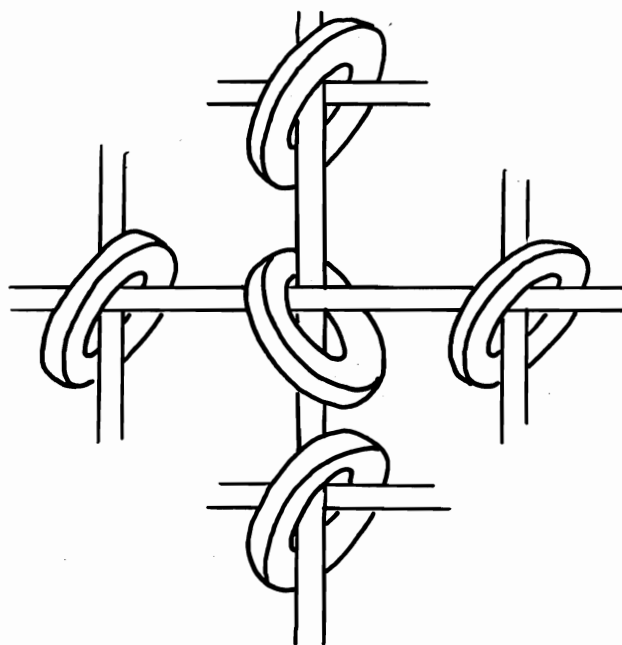
vacuum tubes in computers. An estimated 5,000 computers were in use in the United States by 1960, 300 to 400 of which were large machines. The numbers doubled every two or three years.

From the second generation transistorized machines, miniaturization continued. In the late 1960's and 1970's the development of integrated circuits allowed the design of both mini-computers and mainframes that were very fast and had huge memory capacities. Computers using integrated circuits are referred to as third generation machines.

Another major breakthrough of the 1970's was the development of the microprocessor. Large-scale integration (putting many tiny electronic circuits on a single small silicon chip) made pocket calculators, portable terminals, and pocket-sized microcomputers possible and even common. More and more emphasis has been placed on making the computer smaller, more modular, with faster access time and greater storage capacity. Now, in the 1980's, there are thousands of brands of desktop microcomputers with memory capacities far greater than that of the first huge machines that took up whole rooms, with speeds measured in nanoseconds! (Billionths of a second).

What the future holds for the computer industry I can only guess -but with today's young people becoming computer-literate at an early age, I'm willing to bet it will be fantastic!

* If you would like to have a copy of the complete article, send \$1.50 in check or money order to **Compu-Kids, Computer History, 1709 West Broadway, Sedalia, MO 65301.**



Magnetic Core Memory



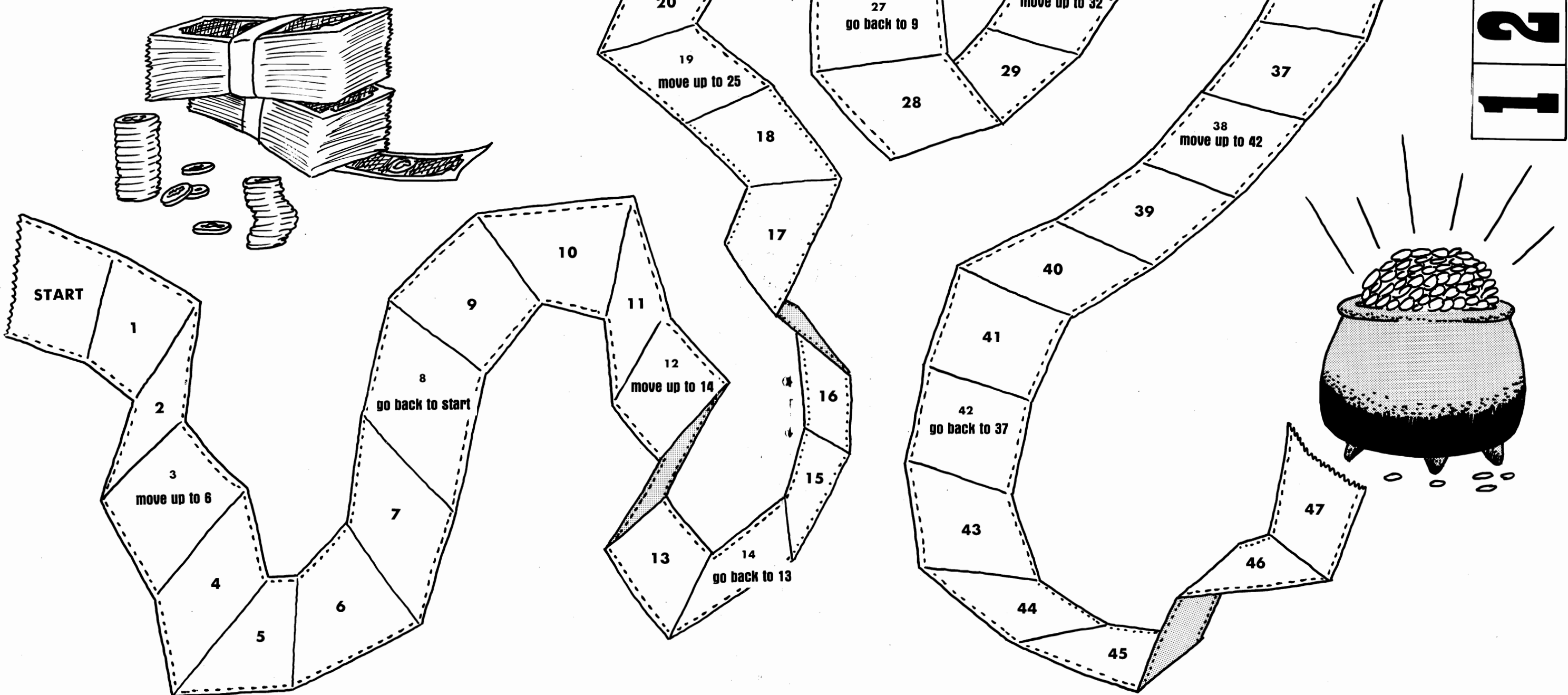
Computer say hunt buffalo...

\$1,000,000 PRINTOUT

(JUST FOR FUN)

The object of the game is to be the first to reach the pot of gold at the end of this computer printout. More than one player may play at any given time. Cut out the numbers 1—6. The numbers should be put in a container to draw from. The person that draws the highest number goes first. Use any small object to mark your place. Move your marker ahead the same number as shown on the card drawn. Watch out for number 23! Good luck; you'll need it!

1	2	3	4	5	6
---	---	---	---	---	---



Lesson Corner

There are two BASIC commands that are overlooked by most programmers because of their seeming difficulty—PEEK and POKE*. These two commands are used to access individual memory locations, write machine code sub-routines into RAM that can be used by BASIC, and also to access system “flags”.

If a machine code sub-routine is needed by your program it can be written into RAM by writing the decimal equivalent of its bit pattern into a data statement, then read and POKEd into the appropriate memory address. After this is done you can use this routine by CALLing it. Be very cautious when you use the POKE command, because it can destroy BASIC programs and even “lock-up” the computer so that only a reset will regain control.

POKE can also be used to change “flags”. Most computers will have a page in their manual marked something like “important addresses”. This page can be the key to unlock many new features of your computer if you will take time to learn a little more about it.

A “flag” is a memory address that contains a certain bit pattern that the operating system or language (BASIC) understands as a “director”. In other words, the flag tells the computer where to put its data. For

example, a flag might tell the computer where to send data from print command (normally the video display) but we would like to print this to the printer. What we would do is to change the flag to the value that would allow the data to go to the printer (instead of the video display) by POKEing the new value at the memory location of the flag. (Here is where you need the manual for your computer to find the correct memory location of the flag.)

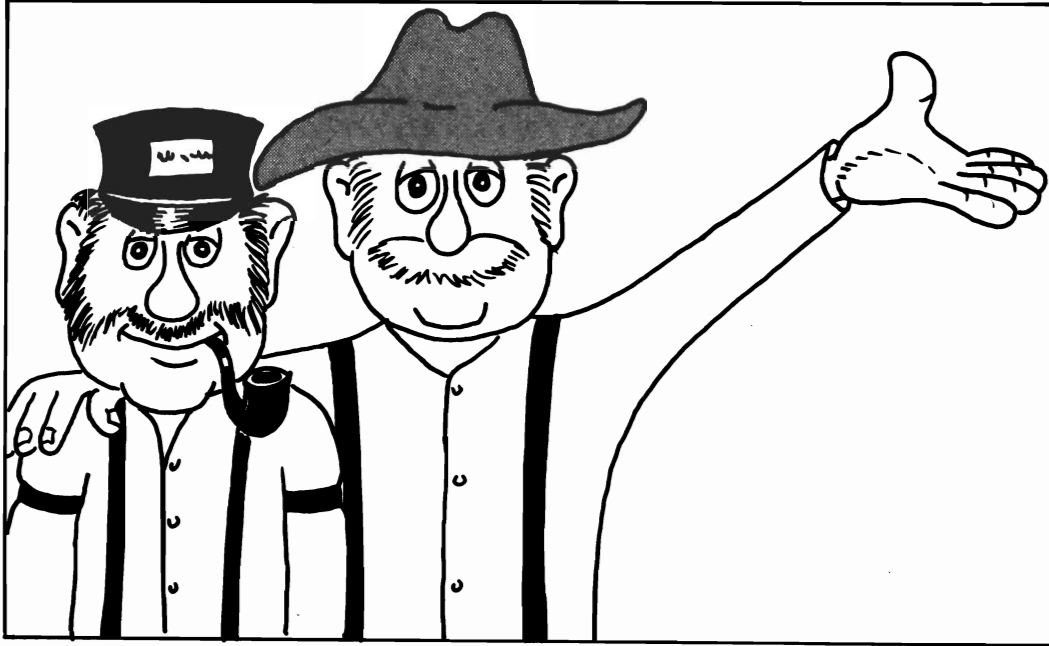
This is only one use of the flags, but it is the simplest to explain and possibly the most used. If you try this, be certain to remember to change the flags *back* to their original value when you are finished, or you may find your computer doing very unusual things!!

The PEEK command is used to look at individual memory locations so we can find out what is stored there. It has many uses, but its most common use is to find out where data is being directed.

This is a very basic idea of what these two commands do, so you will probably want to do some more study on your own to find out more about these powerful programming commands. You might want to try them out and find out how useful your computer can be!

*PEEK and POKE are not included in all versions of BASIC.

The Adventures of Nemo P. Jones (conclusion)



Howdy, youngens! Spring's here and the buds are poppin', and I've been making garden and piling up around the place. Recon your Ma an Pa has more than likely got you youngens all pitching to help. Sure is a good feeling when everybody works together and gets everything looking clean and pretty, isn't it?

Say, have you noticed my spelling and grammar is better? That nice lady at the college says I'm doing great and she's real proud of my progress—and to truth it out with you, so am I. I never thought I'd ever be able to learn this much.

My teacher even explained to me how electricity works. I asked her how she figgered (I probably spelled that wrong) out how electricity works, and she said she read it in a book. She said, "Nemo, almost everything you want to know is

written down in a book somewhere if you just know where to look for it. You can learn anything you want to about any subject you can think of." Well now, jiggers if that don't beat all! Anyways, I came home that night and told Ned about finally understanding how electricity works and how they make it, but I says "I sure would like to see one of those power plants at work." Ned said, "O.K. Nemo, on Saturday we'll load up the whole family and we'll show you a power plant or two." So on Saturday we all piled into their motor home and took off. We first stopped at a Dam and went through the museum, then we walked across the Dam. I'll be truthful with you—I have never seen so much water in one place in my life. Well, I was purely mistified! Then we all got back in the vehicle and took off south again. I said "Ned, where are

we going?" Ned said, "Well Nemo, you enjoyed that lake so much I thought I'd show you a lake that is really different." I asked, "Different how?" "It's built right at the very top of a mountain, and it's the only thing up there." "You mean it rains that much on top of one mountain to make a lake? "No, that's not the only way to get water up there, Nemo. You'll see when we get there. In this case it's easier to show you than to tell you," he said.

Well, we rode for hours and had lunch on the road. About supper time we pulled into one of those nice little roadside parks. Susan stayed in the vehicle and cooked supper for us all and the rest of us went for a walk. We walked past a farm and saw a man plowing a field with a tractor. That may sound like nothing to you, but when you consider that me and Josie have been doing our farming with a pair of mules pulling a turning plow or a double shovel, with us walking behind holding on the handles, either pushing it into the ground or pulling it out from under tree roots—well, plowing with that big old green machine is a far sight different! Josie said, "Nemo, if'n we'd a had a tractor like that in Nebrasky, we cud a plowed up the whole county in a few days!" I declare, I don't think anybody get the "Big Eye" on things worse than Josie! But Ned says that just shows he's got a good imagination, and I agree. He's got that right.

We went back to the camper (that's what the kids call it) and Susan had supper ready. After we'd all stuffed ourselves, Josie said, "I tell you, Susan, iff'n me an Nemo hadda had grub like this when wez youngens, we'd a been giants!" Everybody roared with laughter. Then Elmer got his guitar and Josie got his French

harp (harmonica) out, and they played some country music. You ought to hear that Sally sing! Of course, the other kids sing good too, but that Sally is 'something else' — as the kids would say.

We finally turned in, and I slept like a log. We got up early and after breakfast we started out again, still going southeast. Finally we got to that lake on the mountain. I'll be dog-gone! It *is* right on the tippy-top of a big old mountain.

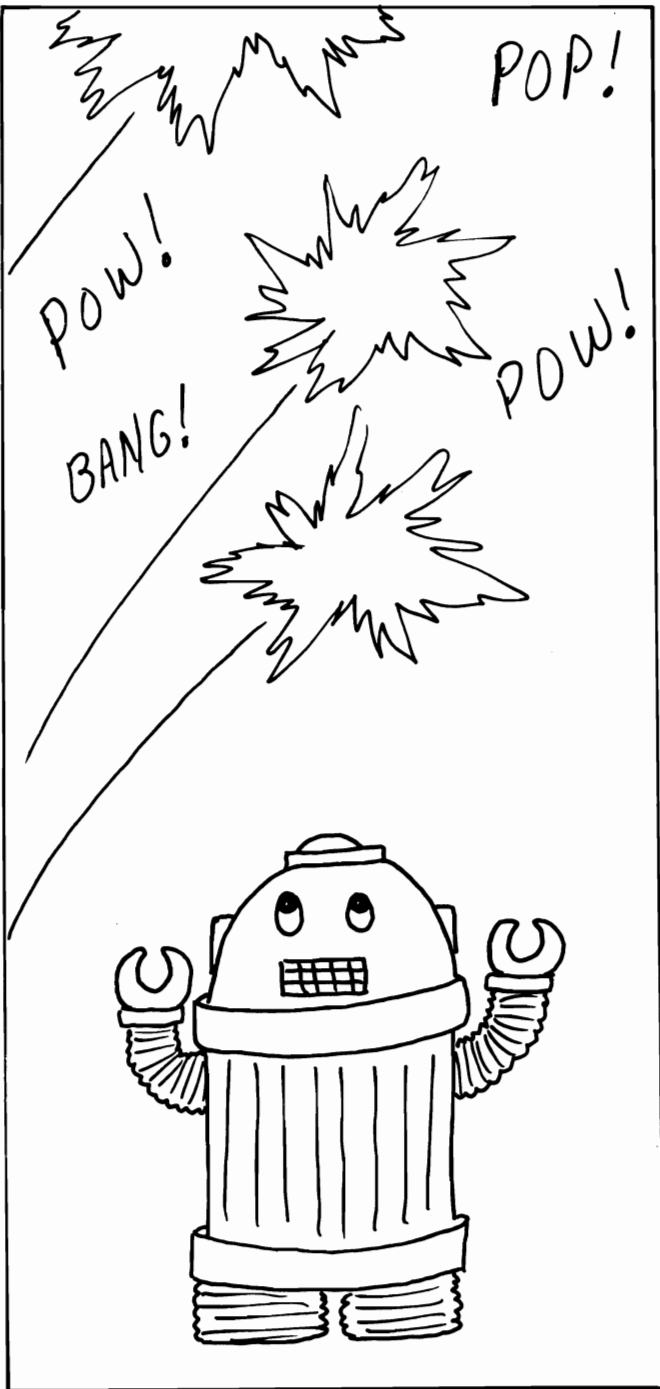
Ned took us to the museum down below it, and they have pictures on the walls and drawings to show you just how it works. Seems they pump the water up the lake at night, and then let it down through the turbines the next day when they need the electricity. (If you haven't seen that, it would make a nice family outing for some weekend. It's called Tomsauk Lake.) I was just plain flabbergasted, but we sure learned a lot. We stopped back by Elephant Rock Park and I never in my life saw such big rocks! The kids sure enjoyed climbing around over them rocks, and I gotta admit we grown-ups did, too.

Well, youngens, I'm really beginning to like the 1980's. There's so much more to learn now, and everybody has a chance to learn it. If ya'll are smart, you'll go to school every day and never miss, because if you miss school you might miss something important. Especially if your school has computers that you can use.

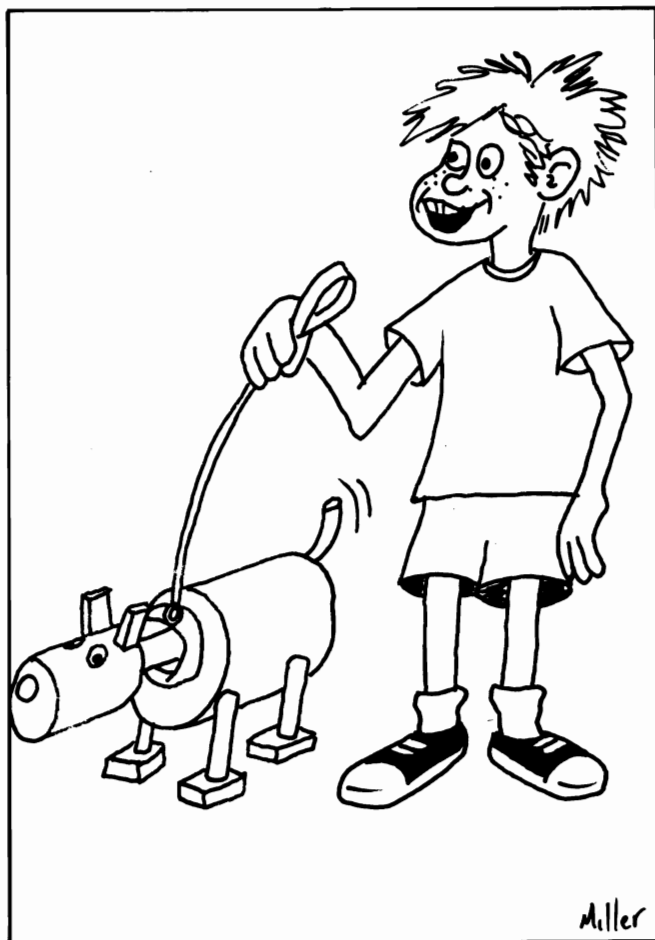
We're getting pretty good at computers. Why, even Josie has already made up two or three games to play on Ned's computer. I don't think he realizes it yet, but Josie's been learning an awful lot from playing with that computer. But Josie will always be Josie! He's working on a new time machine now to take us

back to 1882. Even if he gets it done I don't think I want to try to go back. I like it here!

This is going to be the last yarn I spin for you. I sure have enjoyed writing to ya'll — I hope you enjoyed our story — but we're getting kind of busy now with our lessons. It takes a long time to catch up 100 years! So ya'll be good youngens, and may the Good Lord take a likin' to you!!

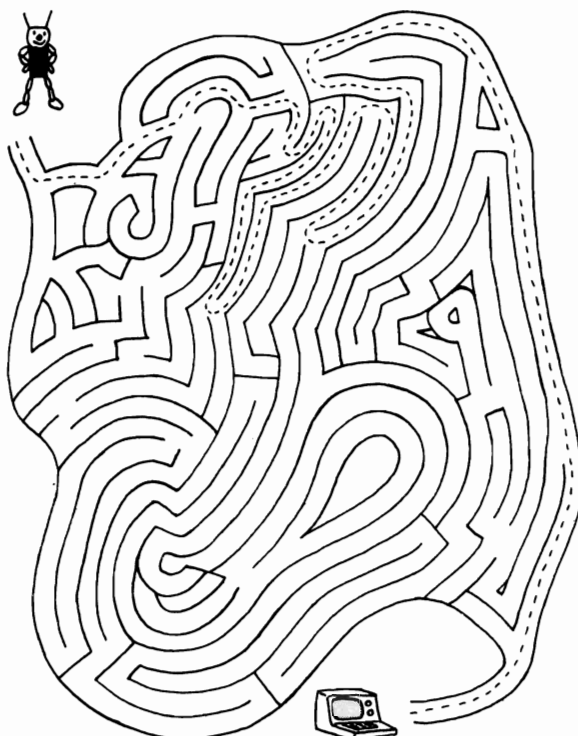


Who started this war?



Can I keep em Mom?

answer to MAZE . . . June, 1982



WORD SEARCH

In the letters on the opposite page, 30 words are hiding. They can be going left to right, up and down, or diagonally. The words are listed below. How many of them can you find?

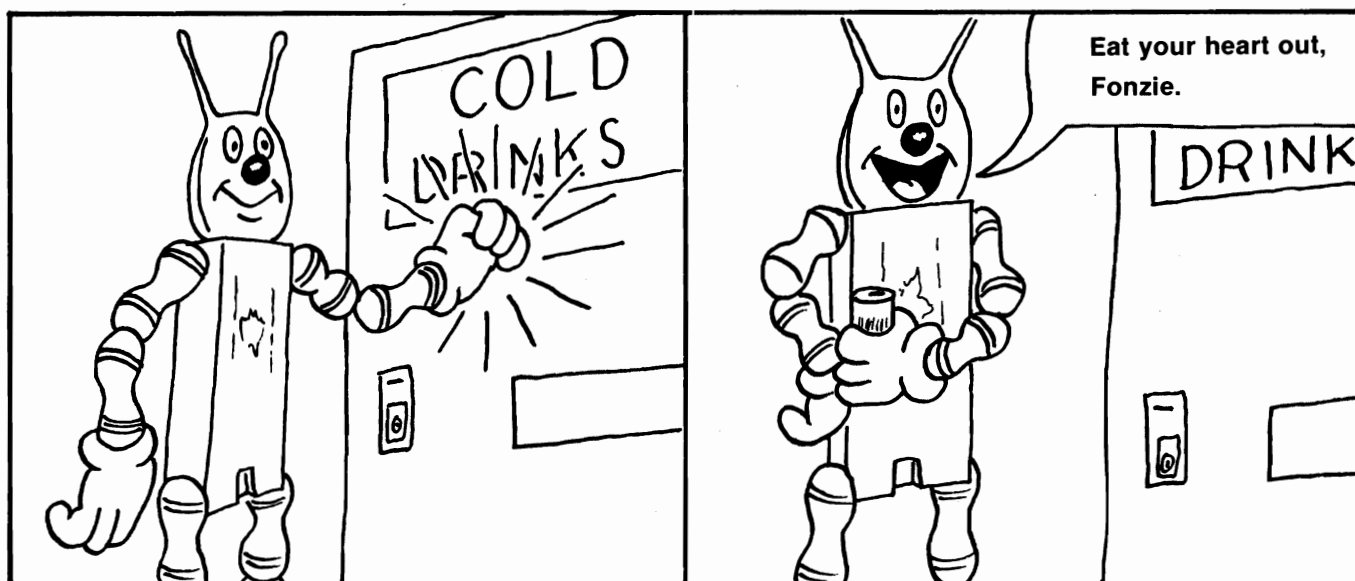
BASIC
BINARY
BREAK
BUFFER
BYTE
CASSETTE
CHIP
CIRCUIT
COBOL
DIGITAL
DISK
ELECTRONIC
FLOPPY
FLOW CHART
FORTRAN

GRAPHICS
KEYBOARD
KEYPUNCH
LOAD
MEMORY
NIBBLE
OPERATOR
POWER
PRINTER
PROGRAM
READOUT
RECORD
SOFTWARE
TAPE
VIDEO

C H I P E G I Y F L O W C H A R T K K O
 B Y T E Q S P U W Y A C A E G I K L N P
 I R T S V P X Z B D D I S K F H J M Q S
 N U W Y O A C E G J M P S S V Y B E H K
 A C E L H F L P T X C H E O M E M O R Y
 R S F R X Z T Q E L E C T R O N I C O T
 Y C J B E R D W U B Y R T D X Q S T E P
 A R Q O P C S T A P E H E R Q O R L D R
 C O B A L E O R T R E A D O U T B S A I
 S U W Y A C E R G O E I K L N B P R T N
 D I G I T A L V D G X Z B D I F H J L T
 N P R K U X Z F O R T R A N A C E O G E
 P O W E R I K M N A P S U W Y A C P E R
 C F I Y L V O R U M X A D G J M P E S V
 Y B E B H I K B N Q T W B U F F E R Z C
 F I L O A D L G R A P H I C S O R A U X
 A D G A J E M P S E V Y B E H K N T Q T
 W Z C R F O I L O B A S I C R U X O A D
 G J M D P S V Y Z B E K H K N Q T R W Z
 K E Y P U N C H C F C I R C U I T I L O

Answer To
Word Search
 June, 1982

(C R T) G R O G P D O N E H I N L O P R O M
 R O G R P P R O G R A M M E R Z I P Z O P P
 P R E O C U A P T O N O S T L O W W H E N
 R B O S Q P R M I M C T R T E R M I N A L
 (S O R T E R) Q U O L L E L E A S R T C R O
 C A C H I I O U T C V R S O L P Q U E S S
 O R E R E N E B O S O F T S C I E M B X C
 M D G I F T O R M I C R O C O M P U T E R
 P R A N P O R R S B S T E N Z R G T T R O L
 U O S T Q U A D M N K Y R C S M L C R L L
 K C L P A T N O N M P S F M O N I T O R L
 I O T I T C O N S S X C E T M O C P N F S
 D N D R U C A B T C M R I N P T S D S D C
 S D O E R C O C W O R I N O U U O M U T R
 N U C S P R A N R T E E T T T F U L W L
 O C C I L E P O V V E L E I E S T D L A L
 S T O S T O R A G E M M X N R T W E A R D
 U O A T B R F I G E R E D E E H A N N R F
 L R A O P Y K E P E M T E H B E R A T T T
 T H J R A P S B X H A G E T D E E M A S K
 A S U C C B E S D M E M O R Y O P L O F D
 (S W I T C H B O A R D) P R O C E S S T R E E
 N B M E C D R O W L T R A N S I S T O R I
 P R O P R I N T E R T R O L L E S T R R
 T A U O M P U T O U T M I T I S T O R S T



PROGRAM OF THE MONTH

Almost everyone is introduced to flashcards sometime after first grade. Either in school or at home, we usually end up using them to help us find the problems we have in math and correct them. If Mom or Dad help you, but get tired of holding the cards up over and over, here's a program that can help.

We have two versions of the program here; one for Apple Computers and one for the TRS-80 Color Computer. Jim Lambirth created the original version for Apple's Integer Basic, then Terry and I (I'm Marty) adapted it to run on the Color Computer. This program lets you choose the math function (addition, subtraction, or multiplication) you want to work on. (If you don't choose,

the machine picks one for you.) Then you are asked to pick a number from 1 to 9, (if you choose 10 the computer picks a number for you), and the computer gives you ten problems to work of the math group you have chosen. The second number of each problem is the number you've chosen, and is the same in all ten problems.

You get three chances to get each problem right. It isn't counted wrong until after you've used all three tries.

Division, as you may have noticed, has been left out. We left it out on purpose so *you* can add it if you want to. Another modification you could make would be to turn it into a two-player game.

The Color Computer version can be run on the TRS-80 Model-III with only minor changes. Remove the color set from the SET commands, alter the PRINT@ locations to fit the different screen size, and take out all the sound commands.

This is a good program to teach math to beginners, and if you have a younger brother or sister around the house this program can keep them occupied for hours.

Have Fun!



TRS-80 Color Computer Version

```

1 REM "MATH QUIZ"
2 REM TRS-80 COLOR VERSION BY T.H.SHOWERS & G.M.WILLIAMS
6 CLS
10 PRINT"    WELCOME TO MATH QUIZ":PRINT
11 INPUT"MY NAME IS C.C.COMPUTER,WHAT IS YOUR NAME":C$
15 PRINT:PRINT"WHAT MATH FUNCTION WOULD YOU    LIKE?":PRINT
20 PRINT"    1    FOR ADDITION"
25 PRINT"    2    FOR SUBTRACTION"
35 PRINT"    3    FOR MULTIPLICATION"
40 PRINT"    4    MY CHOICE"
44 INPUT A
45 IF A<>1 AND A<>2 AND A<>3 AND A<>4 THEN CLS:GOTO 15
46 CLS:PRINT"DO YOU WANT TO TRY A SPECIAL    NUMBER, TYPE 1-9 OR 10 MY CHOICE":INPUT B:IF B<=0 OR B>10 THEN 46
102 M=0:T=T+1:IF T=11 THEN 8000
104 C=RND(9)
106 IF B<10 THEN 1000
108 B=RND(9)
999 REM*****FIND + OR - OR *
1000 IF A=1 THEN 1040
1002 IF A=2 THEN 1060
1004 IF A=3 THEN 1100
1008 A=RND(3):GOTO 1000
1040 E=C+B
1042 CLS(0):FOR X=29 TO 37:SET(X,8,3):NEXT:FOR Y=5 TO 12:SET(33,Y,3):NEXT:GOTO1500
1060 E=C-B:PRINT@416,"YOUR ANSWER MAY BE A NEGATIVE    NUMBER.":FOR X=1 TO 460*3:NEXT X
1062 CLS(0):FOR X=29 TO 37:SET(X,8,3):NEXT:GOTO1500
1100 E=C*B
1102 CLS(0):Y=0:FOR X=29 TO 37:SET(X,5+Y,3):Y=Y+1:NEXT:Y=0:FOR X=37 TO 29STEP -1:SET(X,5+Y,3):Y=Y+1:NEXT
1500 GOSUB5950:GOSUB6955
1501 FOR X=0 TO 63:SET(X,25,4):NEXT
1502 PRINT@416,"WHAT'S YOUR ANSWER":INPUT G
1503 REM*****FIND IF ANSWER IS RIGHT OR WRONG
1504 IF G=E THEN 1550
1505 IF M=3 THEN 1560
1506 PRINT@416,"WRONG ANSWER, TRY AGAIN":SOUND 1,20:INPUTG:M=M+1

```

```

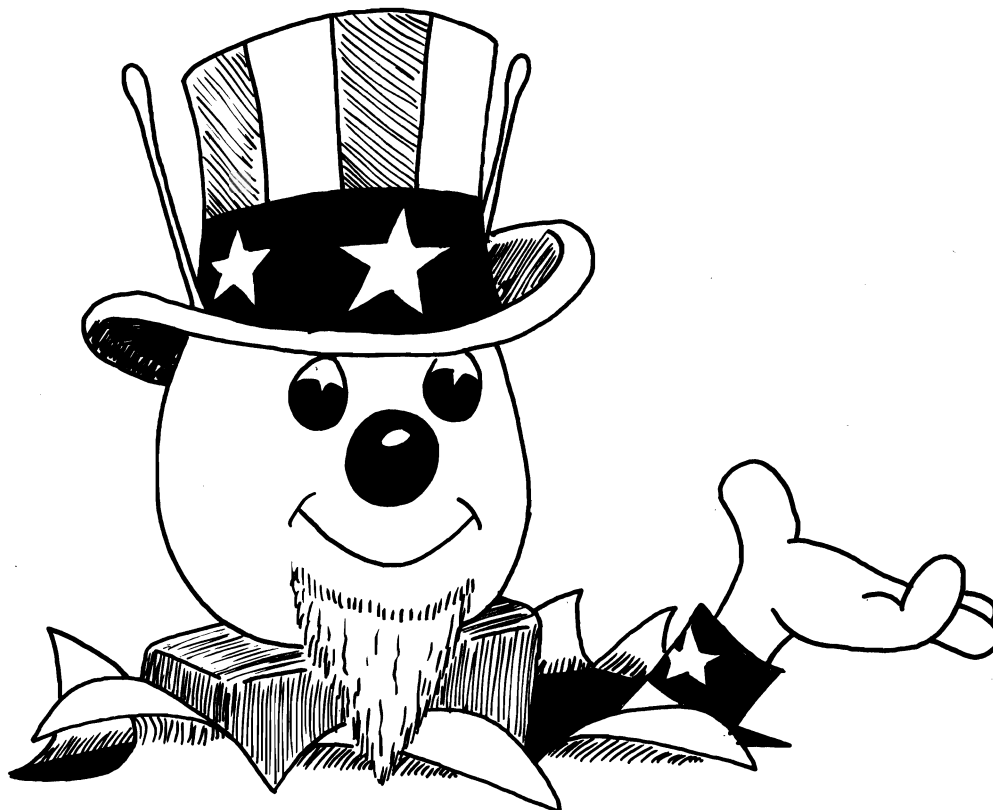
1508 PRINT@416," ":PRINT:GOTO 1504
1550 PRINT@416,"YOU GOT THAT ONE RIGHT.....":SOUND100,20:R=R+1:IF B=10 THEN B=10
1551 GOTO102
1560 PRINT@416,"SORRY, YOU MISSED THAT ONE.":SOUND5,20:W=W+1:GOTO102
5949 REM*****FIND AND DRAW FIRST NUMBER
5950 IF C=1 THEN 6005
5955 IF C=2 THEN 6010
5960 IF C=3 THEN 6015
5965 IF C=4 THEN 6020
5970 IF C=5 THEN 6025
5975 IF C=6 THEN 6030
5980 IF C=7 THEN 6035
5985 IF C=8 THEN 6040
5990 IF C=9 THEN 6045
6005 FOR Y=5 TO 13:SET(18,Y,3):NEXT:RETURN
6010 SET(14,6,3):FOR X=15 TO22:SET(X,5,3):NEXT:FOR Y=6TO7:SET(23,Y,3):NEXT:FOR X=14 TO 23:SET(X,13,3):NEXT
6011 Y=0:FOR X=22 TO14 STEP-2:SET(X,8+Y,3):Y=Y+1:NEXT:RETURN
6015 Y=0:FORL=1 TO 3:FORX=14 TO23:SET(X,5+Y,3):NEXT:Y=Y+4:NEXT:FOR Y=5 TO 13:SET(23,Y,3):NEXT:RETURN
6020 FOR Y=5 TO 9:SET(14,Y,3):NEXT:FOR Y=5 TO13:SET(23,Y,3):NEXT:FOR X=14 TO23:SET(X,9,3):NEXT:RETURN
6025 Y=0:FOR L=1 TO 3:FORX=14TO 23:SET(X,5+Y,3):NEXT:Y=Y+4:NEXT:FOR Y=5 TO 9:SET(14,Y,3):NEXT:FOR Y=9 TO 13:SET(23,Y,
3):NEXT:RETURN
6030 Y=0:FORL=1 TO3:FORX=14TO23:SET(X,5+Y,3):NEXT:Y=Y+4:NEXTL:FOR Y=5 TO 13:SET(14,Y,3):NEXT:FOR Y=9TO13:SET(23,Y,3):
NEXT:RETURN
6035 Y=0:FOR X=22 TO 14STEP-1:SET(X,5,3):SET(X,5+Y,3):Y=Y+1:NEXT:RETURN
6040 X=0
6041 FOR Y=5 TO 13:SET(14+X,Y,3):NEXT:X=X+9:IF X=9 THEN6041
6042 Y=0:FORL=1 TO 3:FOR X=14 TO 23:SET(X,5+Y,3):NEXT:Y=Y+4:NEXTL:RETURN
6045 Y=0:FORL=1 TO 3:FORX=14 TO23:SET(X,5+Y,3):NEXT:Y=Y+4:NEXTL:FOR Y=5 TO 9:SET(14,Y,3):NEXT:FOR Y=5 TO 13:SET(23,
Y,3):NEXT:RETURN
6954 REM*****FIND AND DRAW SECOND NUMBER
6955 IF B=1 THEN 7005
6960 IF B=2 THEN 7010
6965 IF B=3 THEN 7015
6970 IF B=4 THEN 7020
6975 IF B=5 THEN 7025
6980 IF B=6 THEN 7030
6985 IF B=7 THEN 7035
6990 IF B=8 THEN 7040
6995 IF B=9 THEN 7045
7005 FOR Y=5 TO 13:SET(47,Y,3):NEXT:RETURN
7010 SET(42,6,3):FORX=43TO50:SET(X,5,3):NEXT:FOR Y=6 TO7:SET(51,Y,3):NEXT:FORX=42 TO51:SET(X,13,3):NEXT
7011 Y=0:FOR X=50 TO42 STEP-2:SET(X,8+Y,3):Y=Y+1:NEXT:RETURN
7015 Y=0:FORL=1 TO3:FOR X=42 TO51:SET(X,5+Y,3):NEXT:Y=Y+4:NEXT:FOR Y=5 TO 13:SET(51,Y,3):NEXT:RETURN
7020 FOR Y=5 TO9:SET(42,Y,3):NEXT:FOR Y=5 TO 13:SET(51,Y,3):NEXT:FOR X=42 TO 51:SET(X,9,3):NEXT:RETURN
7025 Y=0:FORL=1 TO3:FORX=42 TO51:SET(X,5+Y,3):NEXT:Y=Y+4:NEXT:FOR Y=5 TO9:SET(42,Y,3):NEXT:FOR Y=9 TO13:SET(51,Y,3):NE
XT:RETURN
7030 Y=0:FORL=1TO3:FORX=42 TO 51:SET(X,5+Y,3):NEXT:Y=Y+4:NEXT:FOR Y=5 TO 13:SET(42,Y,3):NEXT:FOR Y=9 TO 13:SET(51,Y,3)
:NEXT:RETURN
7035 Y=0:FORX=50TO42STEP-1:SET(X,5,3):SET(X,5+Y,3):Y=Y+1:NEXT:RETURN
7040 X=0
7041 FOR Y=5 TO13:SET(42+X,Y,3):NEXT:X=X+9:IFX=9THEN7041
7042 Y=0:FORL=1 TO 3:FOR X=42TO 51:SET(X,5+Y,3):NEXT:Y=Y+4:NEXTL:RETURN
7045 Y=0:FORL=1 TO 3:FORX=42TO51:SET(X,5+Y,3):NEXT X:Y=Y+4:NEXTL:FOR Y=5TO9:SET(42,Y,3):NEXT:FOR Y=5TO13:SET(51,Y,3):N
EXT:RETURN
7999 REM*****RESULTS DISPLAYED
8000 CLS: PRINT@224,"YOU GOT "R"RIGHT AND"W"WRONG."
8002 PRINT"DO YOU WANT TO PLAY AGAIN (Y/N)":PRINTC$::INPUT K$
8004 IF K$="Y" THEN T=0:CLS:GOTO15
8006 IF K$(">")"N" THEN 8000
8008 END

```

for Apple Version, see page 39

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What type of computer do you have, if any? _____

that. He was glad that there was someone to show him about the computer. He really wanted to get some use from it. Julie had always been more of a friend than a cousin, but he was beginning to worry that she would think he was a dummy, since she knew how to operate this thing and he hadn't learned how yet.

"Does your school have a class for computers?" she asked.

"No, but I think that the high school does," Ricky answered.

"Well, you really should get into it, now that you have one at home. These are great things to have, Ricky, and anybody that can use one will be able to make it do almost anything they want."

"You make them sound a lot more impressive than they are."

"You mean you're not impressed?" Julie could not believe anyone who had been exposed to a computer could be unenthusiastic about what they could do.

"Well, gimme a chance! I've only had the thing about four hours."

"After dinner we'll get to work, and I'll show you some of the things I've learned about them," Julie said.

"Okay, fair enough."

The talk at dinner was mostly about family matters, mostly about the new job that Julie's Dad had taken in Canada. "It means that he'll be gone for six months, but when he gets back, he won't have to travel anymore for at least three years." Linda was looking forward to having him home. Julie put in, "Yeah, and Dad is getting really good with a computer, too...."

Ricky asked, "I didn't know he worked with them...I thought he worked for a communications company."

Linda explained, "He does. But he

found out how useful they can be, and managed to get himself into a position where working with computers is mostly what he does."

"Well, that is the main thing we want from ours...some use," Ricky's dad said.

"Well, Julie can probably show you a lot about it...her dad says she is a whiz."

The talk turned to other things, and just as soon as it was polite, Ricky asked to be excused, and took Julie with him. They started with some of the very basics, and before long, Ricky knew a "Print" from a "Goto." It didn't take long to catch up with Julie. In no time, he was showing her things he had figured out, and she was getting just as much from the session as he was. Ricky took a break, and went to his Aunt Linda and asked if they were going to be staying long.



"Well, we *were* going home Monday, Why?" she answered.

"I think that if you let Julie stay with us a couple more days, I'll be on my way to figuring this thing out."

"MMMMM, there's no one home, and I guess I could call my neighbor to take care of the cat, so...Sure! Why not? If it's okay with your mom and dad."

"That'd be great! Ricky smiled.

Three days later, Ricky and Julie had spent nearly every minute at the computer. They had both learned a great deal, and Ricky was starting to write his own programs, and debugging them like a pro. He showed his dad what they were doing, and asked if Tom could think of something that he needed to keep track of as far as the business of running the farm was concerned.

"Yes, there is, come to think of it...I was trying to estimate how much feed we are going to need for the next sixty days. Can you give me any help with that sort of thing?"

Ricky beamed, "It's right up my alley, Dad."

He went back to the computer, and told Julie what his dad needed, and they got to work. In about an hour, Ricky called to his dad. He asked him to come to the computer. "Look, Dad...I took the farm records, went back through the last two years, and wrote a program that will estimate what you need."

"How does it work?" Tom asked.

"Okay, you tell us how many head of cattle you have." Ricky continued explaining the program, and asking for information that the computer needed. When he had finished, he said, "Okay, here it is." He pressed a key on the terminal, and the screen was filled with all sorts of information.

"That's about what I had figured, son." Tom said.

Ricky looked disappointed until his dad said, "But I've been at it a lot longer than you have. Estimating things is how I make a living out here." He put his hand on his son's shoulder, and said, "And besides, now that you have that program written, we can use it any time. I think this is great."

"Thanks, Dad," Ricky said. "I don't think I could have done it without Julie." Julie looked up and said, "It always helps when you have two people working at these things."

The two continued their crash course together in how to use a computer, and by the time that Julie and her mom had to leave, Ricky could do a lot of things with the computer! Every time he sat down at the keyboard he got more and more ideas about how to use it. He even wrote several programs to help with the homework from his math class. He found that by the time he figured out what the program needed to do to work, he had also figured out the procedure that he was having trouble with in the first place. He thought to himself more than once, "I didn't know *this* was going to make *that* easier!"

As Linda and Julie were getting ready to leave, Ricky went to Julie and told her, "I hope you had fun, I know I did, and I learned an awful lot."

Julie said, "I think we may be back more often, because I learned a lot, too. I am going to use some of those programs we wrote to help me with my homework."

Ricky had not thought that Julie would need any help with her homework, but he didn't want to say that right now. He was going to miss

having her help with some of the programs he wanted to write.

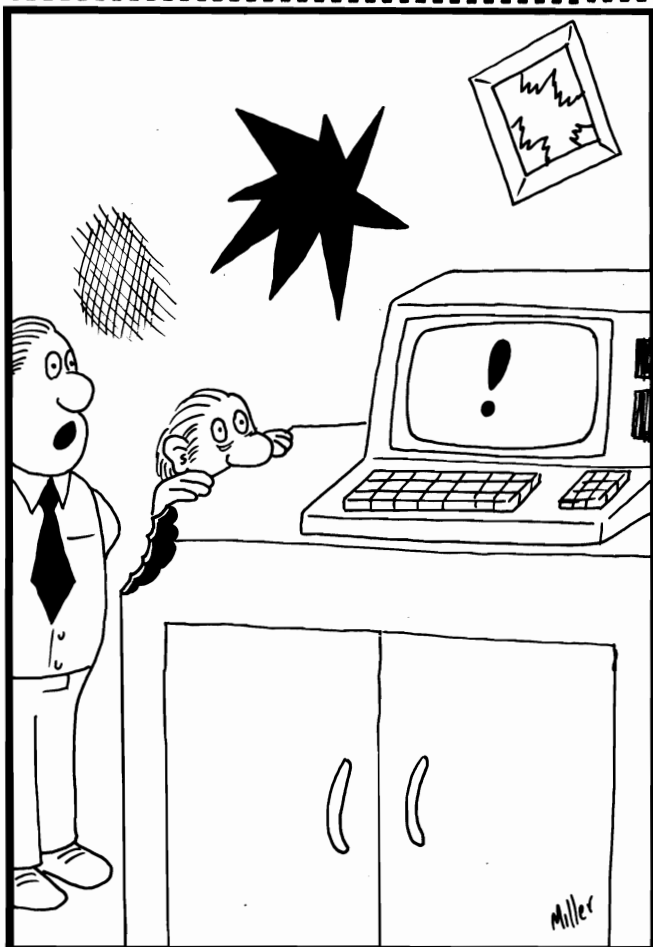
Ricky and his mom and dad stood in the driveway and waved good-bye to Linda and Julie. "We've certainly had a good time this week," Ricky's mom said.

"Uh-huh....And I hope they do come back more often."

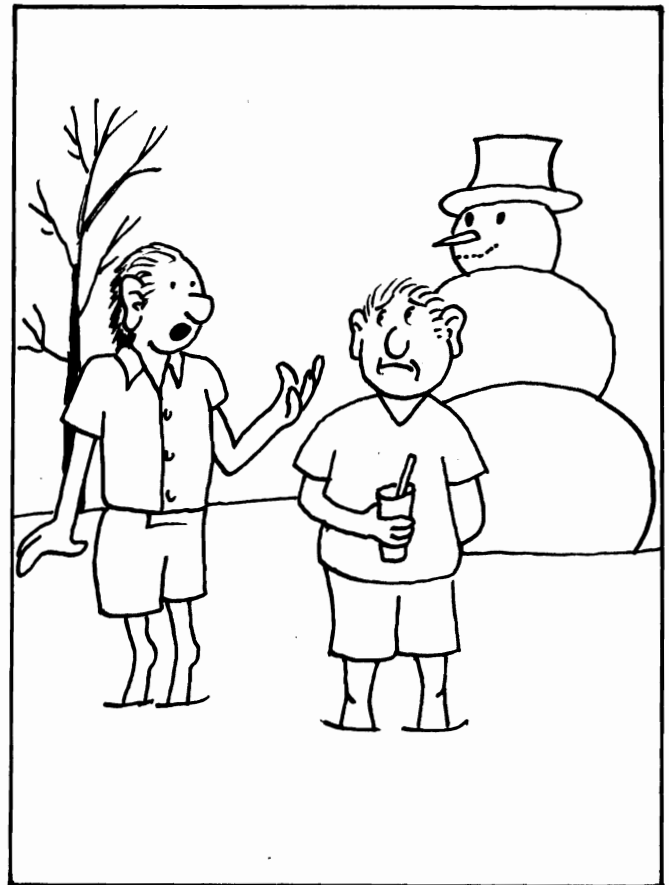
That evening as Ricky was writing still another program, this one to help him finish his geometry homework quicker, his dad came into the room and saw him working. "Son, what do you think of second prize now?"

"Dad," Ricky said, "A motorcycle would have helped me get to school, but I think that darn computer is going to help me get *through* school!"

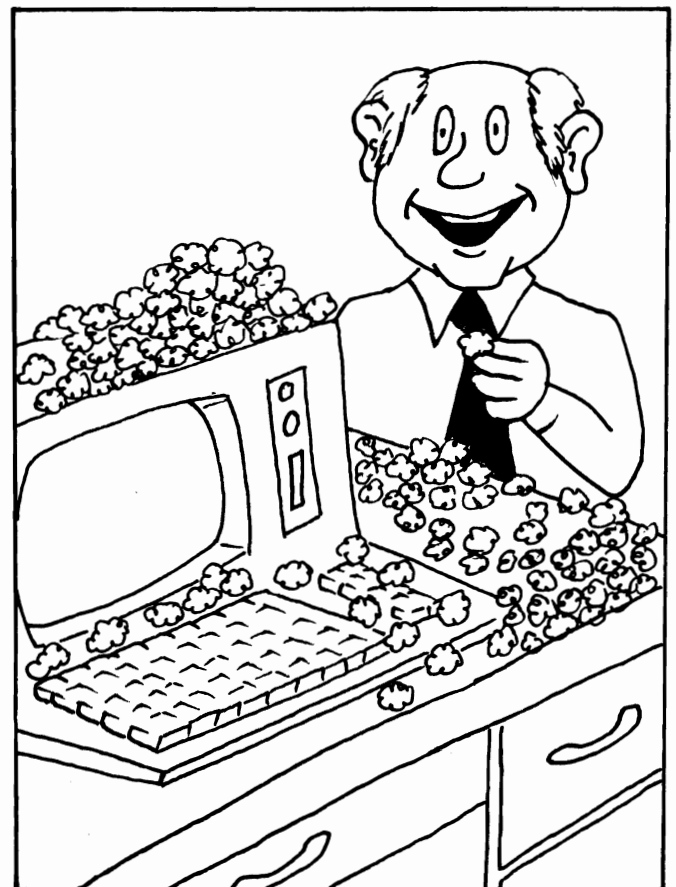
THE END



Boy! He has a temper!



Alright! Who's responsible for the weather program?



The popcorn's great but the program needs more salt.

Apple Version (Integer Basic)

```
1 REM "MATH QUIZ"
2 REM APPLE VERSION CREATED BY J.T.LAMBIRTH
5 DIM C$(60)
6 CALL -936
10 PRINT " WELCOME TO MATH QUIZ": PRINT : PRINT : PRINT : PRINT :
    PRINT : PRINT
11 INPUT "MY NAME IS APPLE , WHAT IS YOUR NAME",C$
15 PRINT " WHAT MATH FUNCTION WOULD YOU LIKE ? TYPE"
20 PRINT " 1 FOR ADDITION"
25 PRINT " 2 FOR SUBTRACTION"
35 PRINT " 3 FOR MULTIPLICATION"
40 PRINT " 4 FOR MY CHOICE"
44 INPUT A
45 IF A<1 THEN 15: IF A>4 THEN 15
46 INPUT "DO YOU WANT TO TRY A SPECIAL NUMBER,TYPE 1-9 OR 10 MY CHOICE",B: IF B>10 THEN 75: IF B<1 THEN 75
47 IF B<1 THEN 75
50 GOTO 100
75 TEXT : CALL -936
80 PRINT "*** LET'S TRY IT AGAIN",C$,"***": GOTO 46
100 GR : COLOR=12
102 LET M=0: LET T=T+1: IF T=11 THEN 8000
103 TEXT : CALL -936: GR : COLOR=12
104 LET C= RND (8)+1
106 IF B<10 THEN 1000
108 LET B= RND (8)+1
998 REM *****FIND +OR-OR*
1000 IF A=1 THEN 1040
1002 IF A=2 THEN 1060
1004 IF A=3 THEN 1100
1008 LET A= RND (2)+1: GOTO 1000
1040 LET E=C+B
1042 HLINE 13,24 AT 28: HLINE 6,10 AT 22: VLINE 19,25 AT 8: GOTO 1500
1060 LET E=C-B: PRINT "YOUR ANSWER MAY BE A NEGATIVE NUMBER "
1062 HLINE 13,24 AT 28: HLINE 6,10 AT 22: GOTO 1500
1100 LET E=C*B
1102 HLINE 13,24 AT 28: PLOT 6,23: PLOT 6,19: PLOT 7,22: PLOT 7,20: PLOT 8,21: PLOT 9,22: PLOT 9,20: PLOT 10,23: PLOT 10,19: GOTO 1500
1500 GOSUB 5950
1502 INPUT "TYPE YOUR ANSWER NOW ",G
1503 REM ***** FIND IF ANSWER IS RIGHT OR WRONG
1504 IF G=E THEN 1550
1505 IF M=3 THEN 1560
1506 INPUT " WRONG, TRY AGAIN ",G: LET M=M+1
1508 GOTO 1504
1550 PRINT " RIGHT": LET M=0: LET R=R+1: GOTO 102
1560 PRINT "SORRY YOU MISSED THIS ONE ": LET M=M+1: GOTO 102
5949 REM ***** FIND AND DRAW FIRST NUMBER
5950 FOR J=0 TO 10 STEP 5
5952 IF C=1 THEN 6005
5955 IF C=2 THEN 6010
5960 IF C=3 THEN 6015
5965 IF C=4 THEN 6020
5970 IF C=5 THEN 6025
5975 IF C=6 THEN 6030
5980 IF C=7 THEN 6035
5985 IF C=8 THEN 6040
5990 IF C=9 THEN 6045
```

```

6000 REM TOP NUM.
6005 ULIN 1,9 AT 20: GOTO 6954
6010 HLIN 17,19 AT J: NEXT J: ULIN 1,4 AT 20: ULIN 6,9 AT 16: GOTO 6954
6015 HLIN 17,19 AT J: NEXT J: ULIN 1,9 AT 20: GOTO 6954
6020 ULIN 1,4 AT 16: ULIN 1,9 AT 20: HLIN 17,19 AT 5: GOTO 6954
6025 HLIN 17,19 AT J: NEXT J: ULIN 1,4 AT 16: ULIN 6,9 AT 20: GOTO 6954
6030 HLIN 17,19 AT J: NEXT J: ULIN 1,9 AT 16: ULIN 6,9 AT 20: GOTO 6954
6035 HLIN 17,19 AT 0: ULIN 1,9 AT 20: GOTO 6954
6040 HLIN 17,19 AT J: NEXT J: ULIN 1,9 AT 16: ULIN 1,9 AT 20: GOTO 6954
6045 HLIN 17,19 AT J: NEXT J: ULIN 1,9 AT 20: ULIN 1,4 AT 16: GOTO 6954
6930 HLIN 17,19 AT J: NEXT J: ULIN 1,9 AT 16: ULIN 6,9 AT 20: GOTO 6954
6953 REM **** FIND AND DRAW SECOND NUMBER
6954 FOR I=14 TO 24 STEP 5
6955 IF B=1 THEN 7005
6960 IF B=2 THEN 7010
6965 IF B=3 THEN 7015
6970 IF B=4 THEN 7020
6975 IF B=5 THEN 7025
6980 IF B=6 THEN 7030
6985 IF B=7 THEN 7035
6990 IF B=8 THEN 7040
6995 IF B=9 THEN 7045
7005 ULIN 15,23 AT 20: RETURN
7010 HLIN 17,19 AT I: NEXT I: ULIN 15,18 AT 20: ULIN 20,23 AT 16: RETURN
7015 HLIN 17,19 AT I: NEXT I: ULIN 15,23 AT 20: RETURN
7020 HLIN 17,19 AT 19: ULIN 15,18 AT 16: ULIN 15,23 AT 20: RETURN
7025 HLIN 17,19 AT I: NEXT I: ULIN 15,18 AT 16: ULIN 20,23 AT 20: RETURN
7030 HLIN 17,19 AT I: NEXT I: ULIN 15,23 AT 16: ULIN 20,23 AT 20: RETURN
7035 HLIN 17,19 AT 14: ULIN 15,23 AT 20: RETURN
7040 HLIN 17,19 AT I: NEXT I: ULIN 15,23 AT 16: ULIN 15,23 AT 20: RETURN
7045 HLIN 17,19 AT I: NEXT I: ULIN 15,18 AT 16: ULIN 15,23 AT 20: RETURN
7999 REM ***** RESULTS DISPLAYED
8000 PRINT "YOU GOT ";R;" RIGHT AND ";H;"WRONG"
8002 INPUT "DO YOU WISH TO PLAY AGAIN (Y OR N)";K$: LET T=0
8003 TEXT : CALL -936
8004 IF K$="Y" THEN 15
8006 IF K$#"N" THEN 8000
8008 END

```

Harold & Sheryl



Hey Harold! Either it's one of your buddies or this is a good place for a stick up!



POKEing Around in ASCII

Jimmy and Air Force Sergeant Bill Jones had gone to Jimmy's school to talk with the Principal, Mr. Winkins, about starting a Computer Club. Mr. Winkins was interested in what they had to say about computers because he knew a lot of other schools were already teaching classes in programming. He wanted to offer classes in his school, too, but he didn't have any teachers that were qualified to teach computer classes.

Mr. Winkins could tell that Bill would be interested in helping to organize a club and be an adviser to the members. He also felt that some of the teachers would help with the club. Once the teachers got involved and interested, some of them might even take additional classes that would help to qualify them to teach their students.

This was an opportunity that Mr. Winkins couldn't pass up. He offered the use of a room for meetings, and he put an announcement on the Bulletin Board so other interested students would know about the club. He also had enough money set aside to buy one microcomputer. The club was off to a good start.

Bill had been studying microcomputers for five or six years before he met Jimmy. His first microcomputer was one that he built himself using a 8008 Central Processing Unit (CPU) chip. A couple of years later

he built an improved version only this time he chose an 8080 CPU. The primary reason he chose the 8080 was, the programs he had written for his 8008 CPU based system would run on the 8080 and the 8080 had more instructions than the 8008.

When Bill read about the Z-80 CPU, that it had even more instructions than the 8080 and all of his programs would run on it . . . he bought one. All of his microcomputers were fun to work with but other people didn't think too much of them when Bill would demonstrate one of his programs. He couldn't really blame them, it's pretty hard to pretend you're excited when a machine adds $86 + 45$ and gets an answer of "CB". We all know the correct answer is "131", right?

Later on, Radio Shack came out with its Z-80 CPU based TRS-80 Model III microcomputer. It was only natural for Bill to buy one that he could run his library of programs on. For this same reason he recommended that Mr. Winkins buy the same computer for their club. It would be a lot easier to learn about computers and to share information and programs if everyone in a club is using a similar computer.

The club's first meeting day arrived. Bill and Jimmy were in the meeting room early, making sure all the computers were set up and operating. Bill had taken his computers to the first meeting so he could show everybody the changes that had taken place in the world of microcomputers over the last five to seven years.

Before long people started to arrive. Bill couldn't believe there were so many people in just one school that wanted to learn about computers. There were boys and girls of all ages, some teachers and

even Mr. Winkins, the principal. Some had a lot of experience with computers but most of them did not have any.

A teacher, Mr. Apple, had taken Computer Science classes in college (to Mr. Winkins' surprise) and knew the BASIC language pretty well. Also, a girl named Kim knew some BASIC that she had learned on her father's computer. Bill asked these two if they would help get some of the members started with BASIC. They agreed.

Bill explained to everybody, the first thing he wanted to do was to discuss some of the mysterious things computers appear to do. At the same time he would try to show that they're not quite the complicated machines some people think they are. He saw a lot of puzzled faces so he figured he had better get busy explaining what he meant.

"Let's take this cassette tape as an example," Bill said, as he placed it into the recorder. The recorder was not connected to the computer when he turned it on to play. A loud noise came from the speaker. It didn't sound like anything Jimmy or the others had heard before. "What is that noise?" asked Jimmy. "Believe it

or not, it is a computer program" Bill said. He connected the recorder to the computer and rewound the tape, depressed the PLAY button again and then he typed the word CLOAD on the computer keyboard.

After a few seconds the word READY appeared on the computer display and then Bill listed the program. The noise that was heard could now be seen on the display in the form of numbers and words. This is something that is taken for granted by people that have never studied computer Machine Language and it does appear to be complicated. (It probably is, just a little bit.)

If you could see the "noise" on the tape it would appear something like you see in figure 1.



Figure 1.

This is a voltage waveform that represents binary numbers on the tape. You remember binary numbers don't you? They're those ones and zeroes or highs and lows we've discussed in earlier issues. All of the numbers and letters that are put into the computer become 8 BITS (Binary digits) inside the computer and are usually called a byte.



When you're typing in a BASIC program from the keyboard a seven bit Binay code called ASCII (American Standard Code for Information Interchange) is used to identify the key that is depressed. Let's use an example of the words PRINT "COMPUKIDS ARE NEAT". (See figure 2.

Key	ASCII	Key	ASCII	Key	ASCII
P	101 0000	C	100 0011	SP	010 0000
R	101 0010	O	100 1111	A	100 0001
I	100 1001	M	100 1101	R	101 0010
N	100 1110	P	101 0000	E	100 0101
T	101 0100	U	101 0101	SP	010 0000
SP	010 0000	K	100 1011	N	100 1110
"	010 0010	I	100 1001	E	100 0101
		D	100 0100	A	100 0001
		S	101 0011	T	101 0100
				"	010 0010

Figure 2

The ASCII code goes into RAM memory and also to the Video Display as it's being typed. Each seven bits takes up one byte of memory so twenty-six bytes are used for this statement. Notice there is a code for the space also, so everytime you use a space as you're entering a BASIC program you're using memory. Spaces are required inside the quotation (" ") marks, but are usually used in other parts of the program only to make it easier to read the program listing.

Let's take a closer look at the ASCII code so you'll be able to use it in your programming. It and other Binary codes are not too meaningful to most of us humans that are used to counting in the decimal number system with our ten fingers. (A Martian with two fingers might understand a two digit binary system though . . .!) The code for the letter "P" is one zero one zero zero zero zero (101 0000). Can you imagine talking to your friends in ones and zeroes? Some of us have in the past and still do. Remember the 8008 CPU based microcomputer that was Bill's

first computer? It had eight switches that were used to input every "one" and "zero" of a program into the computer. It was slow, but at the time it was the best thing since Grandma's apple pie.

This Binary number (101 0000) can be changed so that it's a lot easier to use. Write it, or any other ASCII code, down as shown in figure 3.

	128	64	32	16	8	4	2	1	
P =	0	1	0	1	0	0	0	0	64+19=80
R =	0	1	0	1	0	0	1	0	64+16+2=82
I =	0	1	0	0	1	0	0	1	64+8+1=73
N =	0	1	0	0	1	1	1	0	64+8+4+2=78
T =	0	1	0	1	0	1	0	0	64+16+4=84

Figure 3.

The numbers above the 1's and 0's are called "Powers of 2." In the "P" code there are 1's in the 64 and 16 columns. Add these numbers together. $64 + 16 = 80$. This is a decimal number (80) that is equal to the Binary number 101 0000. Again, all the other codes can be changed in exactly the same way. Here are all of the decimal numbers for the complete statement: 80, 82, 73, 78, 84, 32, 34, 67, 79, 77, 80, 85, 75, 73, 68, 83, 32, 65, 82, 69, 32, 78, 69, 65, 84, and 34.

So now we've got a bunch of numbers - what good are they? Well, if what I said is true, we should be able to use the BASIC POKE statement and POKE these numbers into the Video Display memory and see our original message. Type the following program listing into your computer and RUN it.

```

10 CLS
20 DATA 80,82,73,78,84,32,34,67,79,77,80,85,75
30 DATA 73,68,83,32,65,82,69,32,78,69,65,84,34
40 DATA 999
60 FOR J=16144 TO 16169
65 READ I
66 IF I=999 THEN STOP ELSE 70
70 POKE J,I
90 NEXT J
95 GOTO 60

```

Figure 4. Program Listing

In the program listing, you can see the decimal numbers representing the ASCII codes are labeled as DATA in lines 20 and 30. The program reads one number at a time in line 65 and puts the numbers one at a time into memory locations 16144 through 16169 using the POKE statement in line 70. Video display memory is located between locations 15360 and 16383 for a total of 1024 different locations that could have been used to display the message.

What have we proven? Probably the most important thing is that we've proven that a little bit of knowledge of the Binary number system and the ASCII code opens up a few more doors for you in computer programming. We've shown that inside the computer, the letter "P" can be displayed using the decimal number 80 to obtain the ASCII Binary number code 101 0000.

For those of you that have or will be getting a Monitor Program that gives you the capability to do Machine Language programming (programs in the Machine 1's and 0's Code, usually written using the Hexidecimal number system), there is another number system you need to know. It is called the Hexidecimal number system. This number system has 16 digits (0 through F). They are shown in figure 5 with their Binary equivalent.

Hexidecimal	Binary	Hexidecimal	Binary
0	0000	8	1000
1	0001	9	1001
2	0010	A	1010
3	0011	B	1011
4	0100	C	1100
5	0101	D	1101
6	0110	E	1110
7	0111	F	1111

Figure 5. Hexidecimal/Binary Codes

It's a strange looking number system but it does come in handy

when getting into the inner workings of a computer. Let's see how it can be used with the PRINT statement we used earlier.

The list of Hexidecimal numbers is shown to be equal to groups of four Binary numbers. Now, break the ASCII codes for the word PRINT into groups of four, counting from the right. There are only seven digits in the ASCII code but that's okay, just imagine another zero to the left of all the numbers. It won't change the values or meaning of the numbers. Now find the four bit binary number in the Hexidecimal listing that matches each group of four in the ASCII codes. The hexidecimal number is then written beside the ASCII code as shown. (No adding of Powers of 2 as you had to do when you changed the Binary code to decimal.) The Hexidecimal codes for the complete statement . . . PRINT "COMPUKIDS ARE NEAT" are: 50, 52, 49, 4E, 54, 20, 22, 43, 4E, 4D, 50, 55, 4B, 49, 44, 53, 20, 41, 52, 45, 20, 4E, 45, 41, 54, 22.

Now, using a Monitor Program, we can address Display memory and put the Hexidecimal codes directly into the same memory locations we used when running the BASIC Program. In machine language, the memory address and all instruction codes are in Hexidecimal code. The starting address that we POKEd was 16144 decimal. The same address in Hexidecimal is 3F10. Using the Monitor program we put our statement codes in addresses starting at 3F10. You'll notice, as this is done, the statement appears at the same position on the video display as before only now it's displayed as soon as it is typed in.

Bill felt that he had thrown enough information at everyone for their first meeting, so he decided to let the

Dictionary Page

Criteria — The facts or conditions required in making a decision.

Transistorized — Equipment using transistors for active signal processing functions.

Software House — A company which offers software support services to users.

Assembly Language — 1. A low level language who's OP code can be directly decoded by the Central Processing Unit (CPU) into machine executable codes.
2. Assembly language uses mnemonics which assist the operator in remembering machine instructions.

Example: LDA — LOAD ACCUMULATOR

members experiment with the computers for awhile. Some of the members told him that what he was talking about was way over their heads. He reassured them, "The best way to learn is to experiment and practice. Sit down at the computer and try different things, over and over if you have to. Don't be afraid of breaking the computer. You can't break it by practicing programming - unless you get mad and hit it, that is!"

Jimmy was kind of quiet after the meeting was over, but he was just thinking about all the questions he

had about the discussion. He would be asking for help from Bill and his new friends in the computer club every chance he got. After all that is what a club is all about . . . "friends helping each other."

This is just the beginning and in future issues of **CompuKids** we will be building on what we started today. In the meantime, if Machine coding (1's and 0's) interests you, I recommend you look through the books at your local library or computer store bookshelf for a good book on the subject.

'Name the Computer Bug' Contest Winners!

We know everybody is probably anxious to find out who won the Computer Bug Name Contest, but first we want to thank everybody who sent names in. We want to show you some of the names we received. They were all so good the Computer Bug had a terrible time deciding which one he liked best! Here are the names:

Micky
Lulu
Bugwiser
Electric
Chippy
Buggy
Memory Chip
Orcim (Micro backwards)
Glitch
GiGo
Faux Pas
Lady Bug
Wiz
Micro-Jiminy
Bogie the CompuBug
Buzzy the Computer Bug
Whisk Wire
Bugger
I.C.
A.M.I.C.O. (e - mə ' - Ko)
(Arithmetic Memory Input Control Output)
Brains
Data Dan
Electricect
Freaky Funny Farout Figure

Lovebug
Silly Dilly CompuCreature
I. C. Chip
Memo-Bug
Mr. Mind
Bugware
Pu Bugger
Pro Bugram
C.P.U. Bug
C.B. (for Computer Bug)
Compu-Bug
I.C. Nibble
Chipper
Computerized Computer Eater
Printer Pat
Sizzle
Micro Mike
Digital Dummy
Digit'Al
Recording Ralph

It took a long time, and he changed his mind a lot, but finally the Computer Bug decided that these were his choices:

1st — CHIPPER

sent in by: Steve Huff
1027 Roe Ave.
Overland Park, KS 66207

2nd — CHIPPER

sent in by: Stacy Converse, age 11
9024 Grandview
Overland Park, KS 66212

3rd — MICRO MIKE

sent in by: Greg Patrick, age 8
6335 Millbrook
Shawnee, KS 66218

4th — GLITCH

sent in by: Johnny Camm, age 8
13617 River Road
Milan, Ohio 44846

"Chipper" wants to thank everybody again for helping him find a name. Everyone who entered the contest will receive a picture of him autographed with his new name.

Please allow 4-6 weeks for delivery of prizes.

— CONTEST REMINDER —

For Club Members Only

**You have only until July 30, 1982 to
Design a Cover for CompuKids Magazine**

CONTEST RULES:

1. Cover must be computer related and of interest to young people.
2. Designs should be submitted on poster board (11x14 inches) and in color (crayola, pastel, or watercolor). The title, date, etc. should be left off.
3. Entries must be received by July 30, 1982.
There are no restrictions on the number of entries submitted by an individual but each entry must be mailed separately.

Prizes will be awarded in each of the following age categories:

6 - 8
9 - 11
12 - 14
15 and Up

PRIZES:

- 1st—Your cover design published and \$25 cash.
2nd—\$10 in cash and your name published as a winner.
3rd—\$5 in cash and your name published as a winner.

Entries should be submitted to:

CompuKids Cover
CompuKids Magazine
P.O. Box 874
Sedalia, MO 65301

Good Luck!

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- ☐ One (1) year subscription - \$16.00 (Save \$7.40).
- ☐ Six (6) months trial subscription - \$8.00 (Save \$3.10).
- ☐ Payment enclosed (Check or money order - no cash, please)
- ☐ Please bill me later (A \$1.00 billing fee will be added)

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